Modern Metals

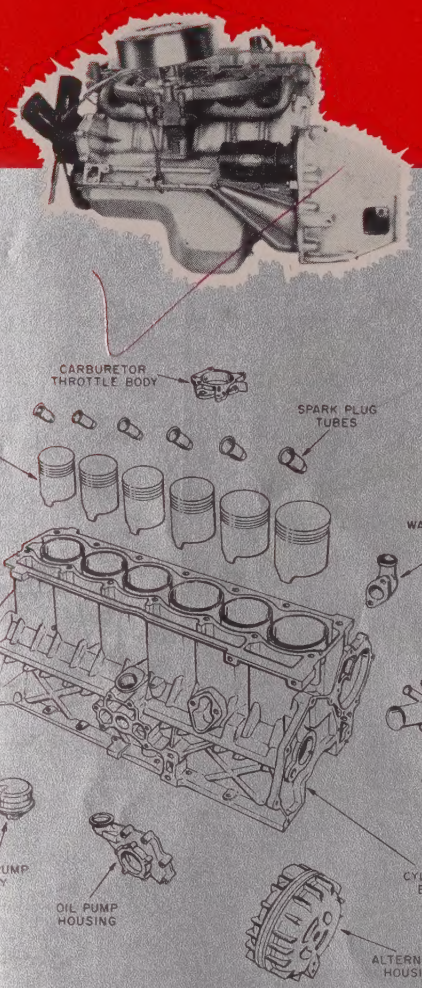
DEC 5 19

NOVEMBER, 1961

MSD-P LIBRARY

ALUMINUM IN AUTOS

The aluminum engine is well established. Further increase in consumption depends on big volume sales of 1962 models. Use in bumpers, wheels, seen as next major applications (see page 28).



Aluminum Usage in Chrysler's 225-Cubic Inch Engine

AJAX
First Name
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Extrusion
Tools
AJAX
Steel and Forge Co.
205 ADAIR ST.
DETROIT 7, MICHIGAN
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Everyone fabricating aluminum sheet knows there are subtle, but none-the-less real, differences in its performance on a press or other metal forming line. When "Truspec" Aluminum Sheet was first introduced by Scovill more than ten years ago, our aim was to reduce such variances to an absolute minimum . . . to deliver an Aluminum Sheet comparable in UNIFORMITY and dependability to Scovill Brass Strip and Sheet.

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That's why it has been called the "well-behaved" Aluminum Sheet. We'd like you to enjoy similar advantages. A trial order will accomplish this.

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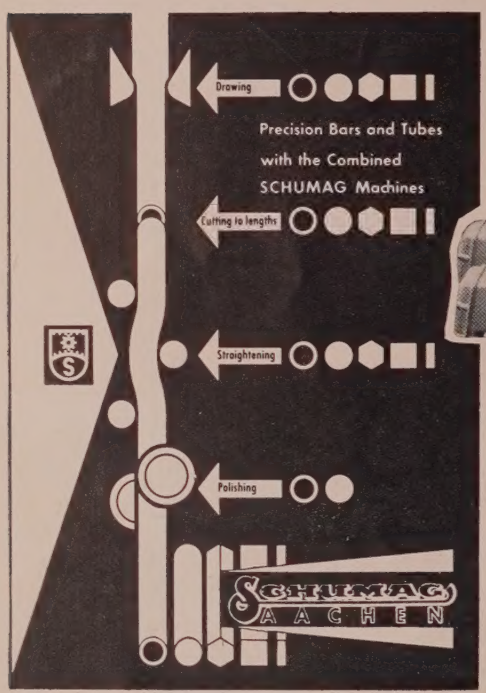
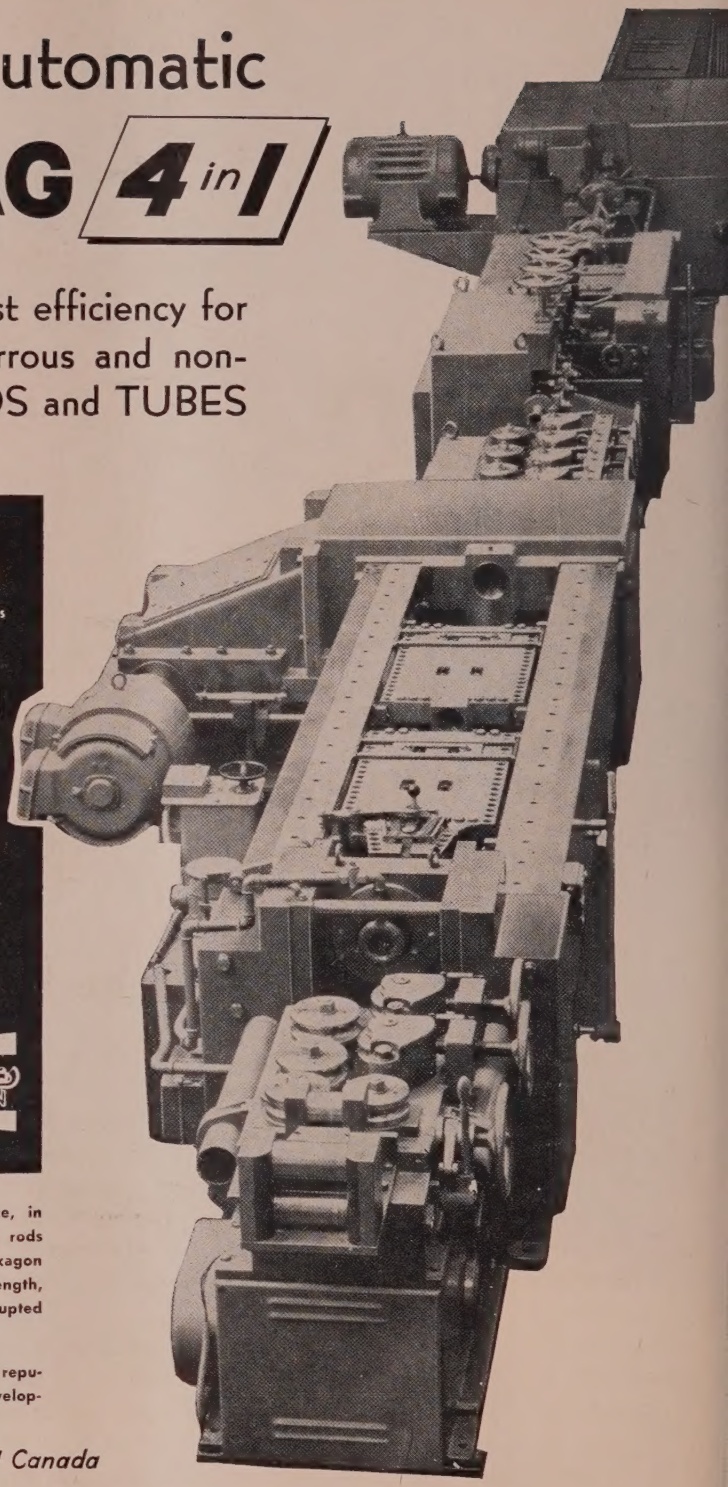
10SC61

The fully automatic

SCHUMAG 4 in 1

ASSURES... greatest efficiency for manufacturers of Ferrous and non-Ferrous BARS, RODS and TUBES





- SCHUMAG "4 in 1" machines produce, in one continuous operation, finished bars, rods and tubes from round, square or hexagon material. They will finish draw, cut-to length, straighten and polish in one uninterrupted sequence.
- SCHUMAG "4 in 1" enjoys world-wide reputation as the ultimate in technical development.

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AMERICAN LAUBSCHER *Corporation*

250 W. 57th St., New York 19, N. Y.

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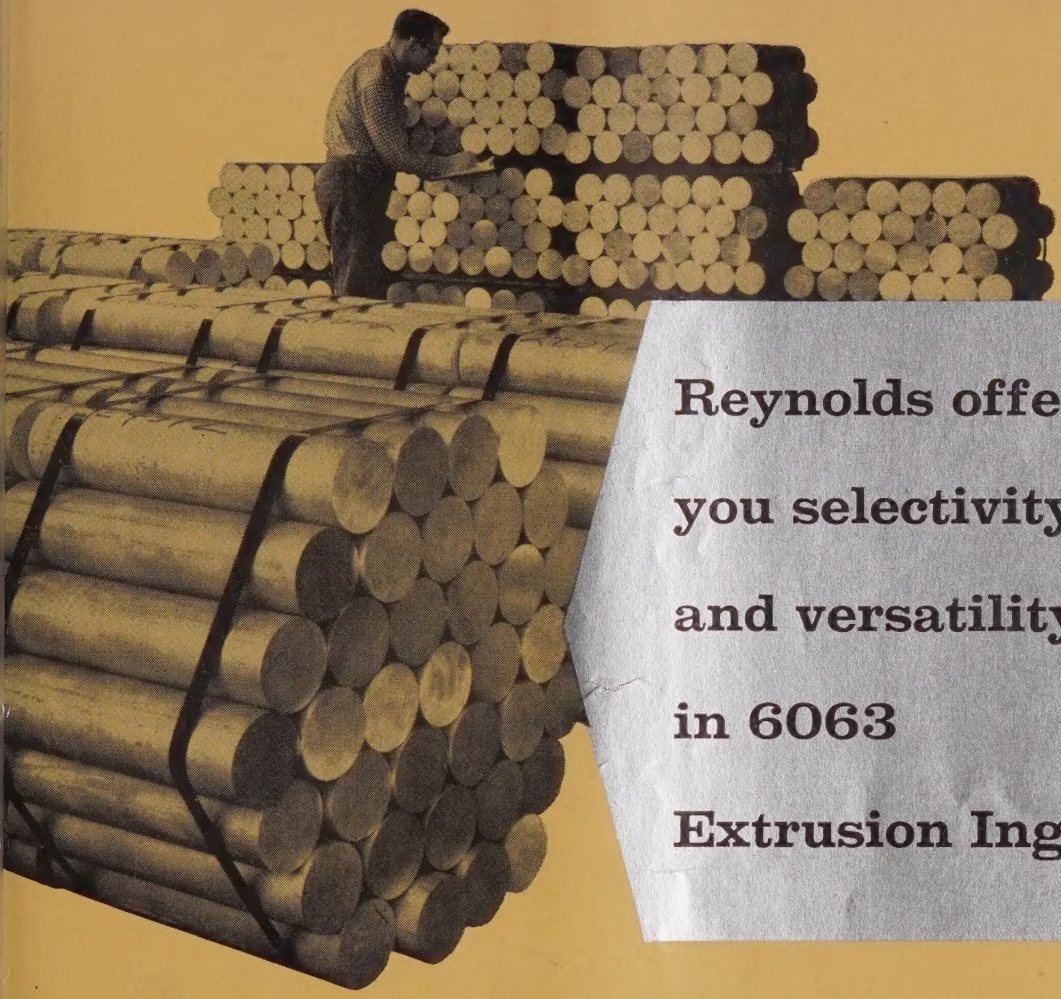


Reynolds offers you selectivity and versatility in 6063 Extrusion Ingot

Choose the one for the job to be done

6063 T6063 S6063

ynolds offers refinements of 3 homogeneous ingot that are igned to increase extrusion iciency and product perform-e. Availability of specifications *063* and *T6063* as modifications hin 6063 chemical limits fur-r adapt the "all purpose" y to some of the specific prob-s of the extruder.

'or T42 or T5 temper in hol- sections or thin solid sections Reynolds S6063. It will give proved surface and extrude at ner speeds. It is not recommended when mechanical properties of T4 and T6 are required.

For maximum strength and hardness use Reynolds *T6063* where some degree of extrudability and surface finish can be sacrificed.

Reynolds regular 6063 is still the industry standard of excellence for the majority of extruded shapes.

Our complete Engineering Services and Metallurgical Departments are always at your service to provide more specific information and problem solutions on any area of extrusion production.

Reynolds Metals Company, P.O. Box 2346-GM, Richmond 18, Va.

Watch Reynolds exciting TV programs on NBC: The Dick Powell **Reynolds Aluminum Show** every other Tuesday; **Say When,** weekdays; **All Star Golf**—in living color—every Saturday.

REYNOLDS ALUMINUM

Question:

How thin can sections be made by casting aluminum?

Question:

What type lubricants are used for impact extruding of aluminum?

Answers

to dozens of the most frequently asked questions concerning casting and impact extrusion of aluminum are given in these informative Reynolds brochures.

Write today for either—or both—of these Reynolds publications.

Free to everyone who has questions about aluminum!

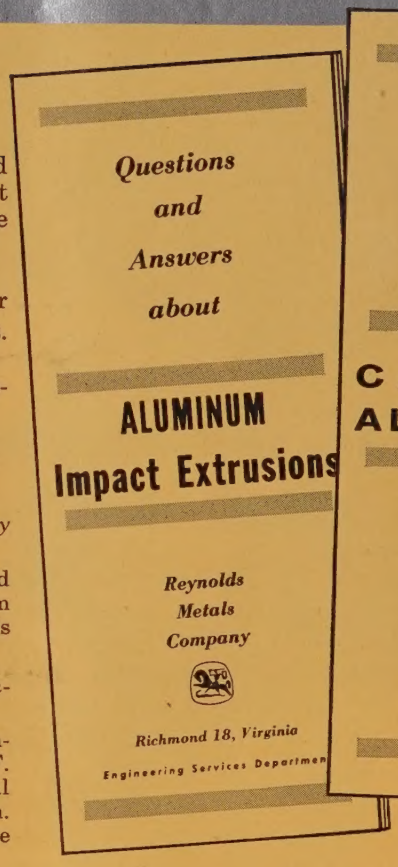
For those who can't wait 'til the booklets arrive:

Q. *How thin can sections be made by casting?*

A. Aluminum alloys can be cast in sand or permanent molds in minimum sections 1/8 inch thick. Thinner walls are possible in die castings.

Q. *What type lubricants are used for impact extruding?*

A. Lubricants must have high film-strength and flash points from 500°F. up because of the high frictional heats generated during extrusion. Animal-fat base lubricants and some waxes have proven satisfactory.



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P. O. Box 2346-GM, Richmond 18, Virginia

SEND me the following Reynolds brochures at once . . .

_____Questions and Answers about Casting Aluminum
_____Questions and Answers about Aluminum Impact Extrusions
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*Position*_____

*Firm*_____

*Street*_____

*City*_____ *Zone*____ *State*_____

REYNOLDS ALUMINUM

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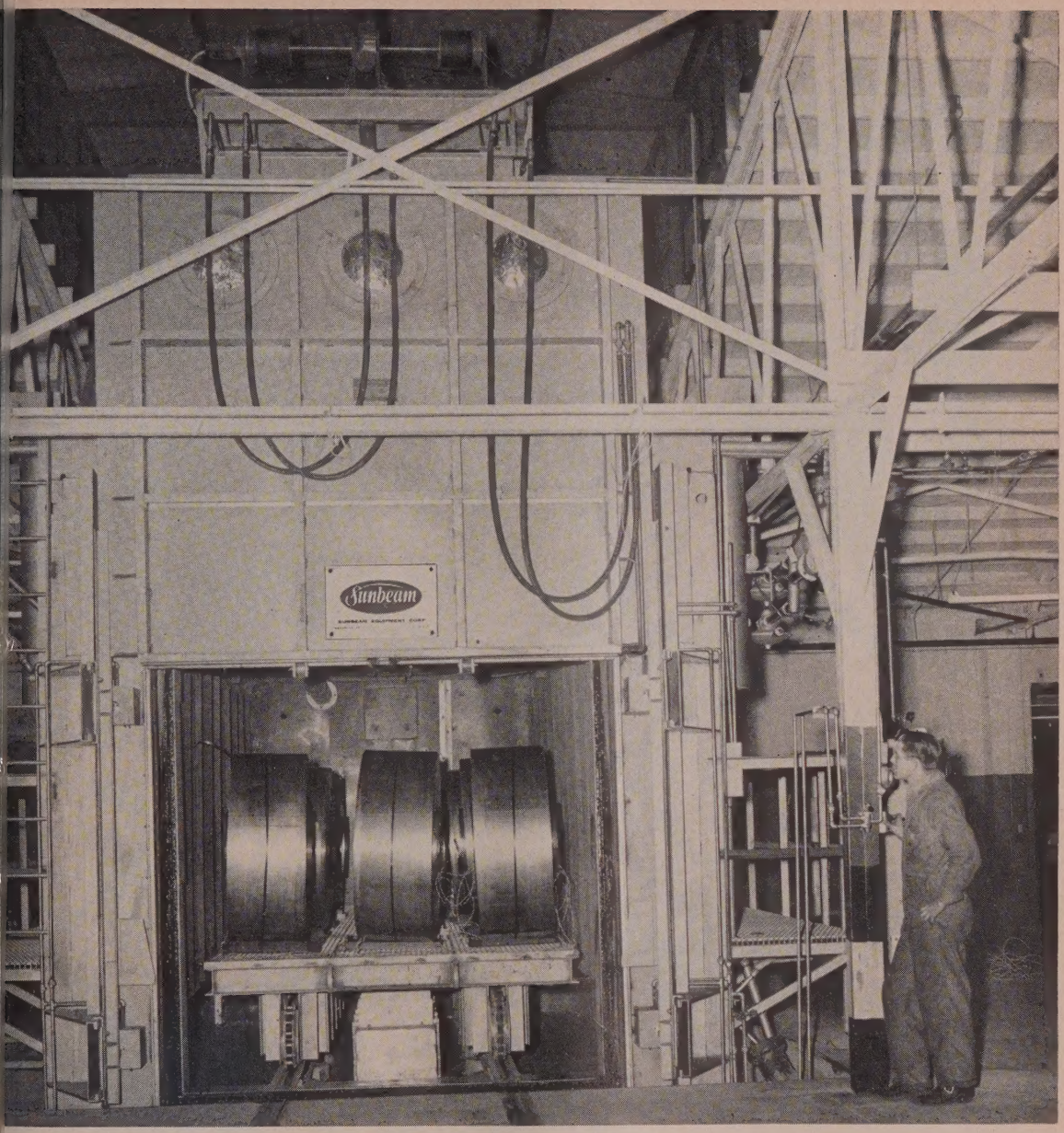

unbeam Furnace holds close tolerances at American Screen Products

nerican Screen Products Company is the world's rgest manufacturer of high quality roll formed alumum screening. They recently installed this new UNBEAM annealing furnace as an integral part of eir reduction mill operations for processing alumum coil.

This furnace was specifically designed to heat 30,000 ounds of aluminum coil from 70°F. to 900°F. in six ours. Temperature tolerances of plus or minus 10°F. ave been maintained in the 500°F. to 1200°F. range. addition to meeting these basic furnace specifications, SUNBEAM engineers devised a unique continuous roller chain* for carrying the furnace car in and out of the furnace. No other furnace builder offered this important design feature, which reduces the cost of maintenance and eliminates lubrication.

This is another case where SUNBEAM project and design engineers drew upon their vast experience with aluminum to design and build a superior furnace. This creative engineering can be yours—your key to greater efficiency . . . increased production . . a finished product of highest quality. Write or call Sunbeam Equipment Corporation, 196 Mercer Street, Meadville, Pennsylvania.

*Patent Applied For

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A&M's complete modern laboratory insures that every heat of every alloy meets your exact specifications. In addition our entire staff of metallurgical scientists is at your service in the solution of design, foundry and alloy selection problems. This insures you the very best in top-grade castings at a competitive price.

Remember, the best in finished product can only be made from the best quality alloy.

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ASTER: Modern Metals, 435 North Michigan Avenue, Chicago 11, Illinois. Return Postage Guaranteed—Form 3579 Requested.

ODERN
METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

HE COVER: One model of the Buick has been switched from an aluminum engine to a cast iron job this year, but r has come up with a 6-cylinder um powerplant for the Lancer and liant. It's too early to determine the to which these moves will affect the per-car usage of aluminum in the del year. As of this writing, a slight seems to be in the offing. But a ales year could prevent a decline in luminum sales to the auto industry. s issue, you'll find auto industry on pages 28, 36, 42 and 68.

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rn Metals has by far the world's largest ion among light metals fabricators, found-d product manufacturers who use alumi-magnesium, and titanium. Circulation: ver 15,000 copies per month. Acceptance controlled circulation at Barrington, Ill.

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Modern Metals

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ALUMINUM IN THE '62 CARS ..... H. K. Darby 28
With no new application breakthrough in the offing, aluminum suppliers must rely on a good sales year for autos to keep Detroit's aluminum consumption riding high.

CHROME PLATING ALUMINUM CYLINDER BORES ..... L. W. Raymond & A. K. Wood 36
Plating company officials believe a coating of chromium can replace the iron cylinder liners presently used in most aluminum engine blocks. Advantages would include better heat conduction, less weight, manufacturing ease.

REFINING ALUMINUM-SILICON CASTING ALLOYS ..... Y. P. Telang & M. G. Urdea 42
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Olin survey of $750 million business reveals a slowing of "phenomenal" growth of past 15 years. Window manufacturers report industry's problems; suggest several cures.

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MACHINING VALVES FOR ALUMINUM BAR STOCK 72
Manufacturer of fluid control valves slashes production time by switching from castings to machined bar stock.

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for every purpose

Uniform performance, high production and long service are unfailing characteristics of these better rolls.

Preferred by leading mills throughout the nation for more than half a century.

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HYDE PARK
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Rolls
Rolling Mill Equipment
Gray Iron Castings

Letters

Needs High Purity Aluminum Strip

Sirs:

Several months ago you published an article on High Purity Aluminum Strip and mentioned the name of a company currently producing it.

We have need for 10,000 lbs. of 99.999% and would like to get in touch with a manufacturer. . . .

"J" — New York

MM—Right you are. The name of the producer is Consolidated Aluminum Corp., Jackson, Tenn.

Wants Extruded Bronze Mouldings

Sirs:

We are looking for a source of supply for extruded bronze moulding. . . . Names of extruders or suppliers would be appreciated.

"F" — Massachusetts

MM—We have sent you a couple of names of bronze extruders (although there aren't many left anymore). If anyone wants to contact Mr. F, we'll forward all letters.

How To Succeed Without Even Trying

Sirs:

I suppose you rascals know you came out exceedingly well in a recent magazine reader preference survey conducted by a leading supplier to the metalworking industry; that you outpulled many of the biggest magazines as "most useful," etc. Thought you'd like to know that this magazine reader survey has been widely circulated in the East, and I'm sure it hasn't done you any harm. . . .

"J" — New York

MM—One has to get lucky once in a while and Modern Metals came out of this extensive survey smelling like a rose in a bomb shelter. We feel like that new Broadway play, "How To Succeed in Business Without Even Trying." Of course, our 47 active readers helped plenty: each of them filled in an average of 50 questionnaires.

It just happens that we have printed several thousand booklets on the survey. If anyone wants a copy or two, write to "Camel Driver" in our attic. They'll be shipped via the fastest means known to man.

A Pump For Aluminum and Zinc Alloys

Sirs:

In your letter of September 14 you furnished us with the information concerning Lindberg's automatic ladling device. This is wonderful information for which we are very grateful. However, this is not the ladling device we were interested in. If I explained a little about the device in question, perhaps it would help in finding the information we desire.

It is a hinged device with one end fastened securely to the side of the furnace. The ladling end is then lowered to pick up the metal. It is elevated to a position at which the metal would run down a trough into the mold. The movement of the ladle is accomplished by the use of an air or hydraulic cylinder. Your continued indul-

Available

Sales Engine

Seven years experie
selling aluminum
Midwest and East

Good knowledge of indu
Seek opportunity with
gressive aluminum firm
with supplier to the indu

Best of references.

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Must be modern and i
good shape.

Will also consider buyin
good, usable dies for same

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METALLURGIS

Major aluminum producer de
sires metallurgists for contro
and project work and for posi
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Experience in D.C. castin
and/or extrusions desirable
Permanent position with libera
benefits.

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Complete production machines and dies
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dows and doors. Owner has other inte
sacrifice. Located in Southern New
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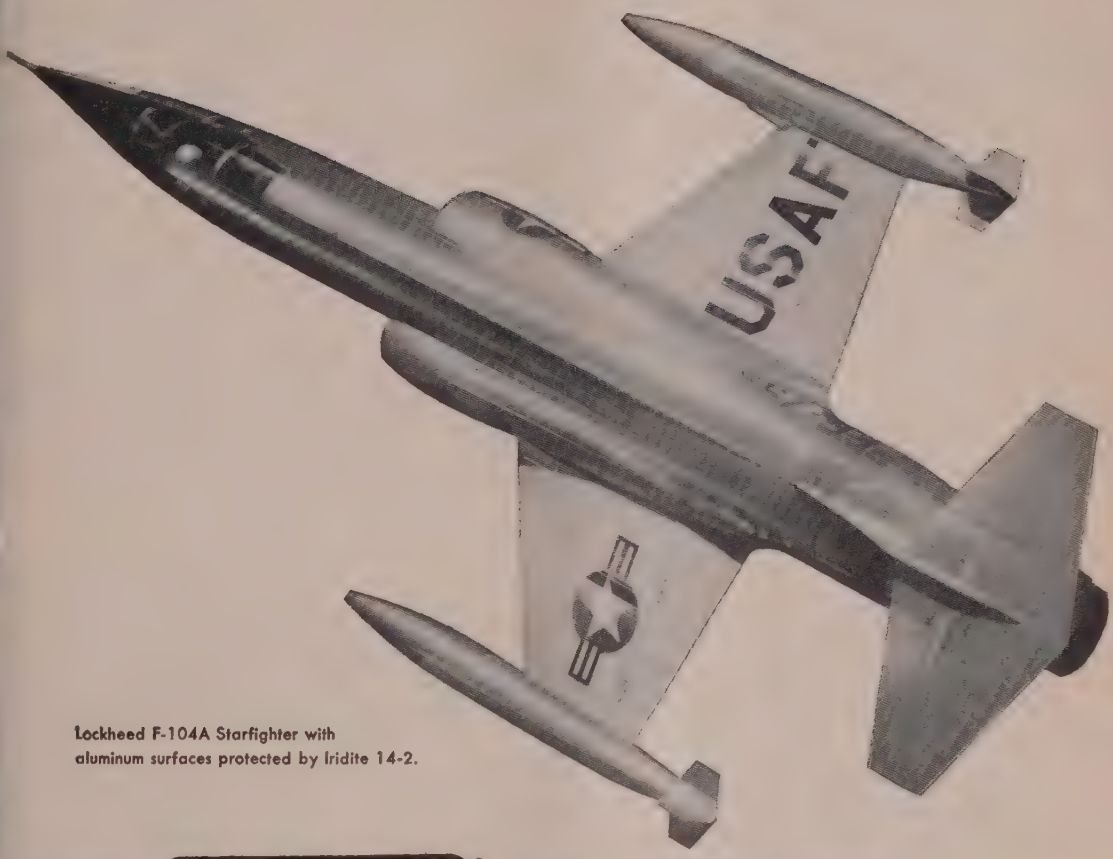

Lockheed F-104A Starfighter with aluminum surfaces protected by Iridite 14-2.

How IRIDITE® Helps Lockheed Cut Aluminum Finishing Costs

Nine years ago, Lockheed switched from anodizing to Iridite chromate conversion coatings. That year, they saved over $40,000 in materials and manpower.

Today, Lockheed is still saving money with Iridite 14–2. Here's how:

Process time is reduced from 45 minutes to a maximum of only 5 minutes. Three times as much work is processed in a single run. Easy-to-load baskets, replacing costly anodizing racks, save $15,000 per year. Expensive electrical equipment is eliminated because Iridite is a simple chemical dip.

Moreover, Iridite 14–2 gives improved corrosion resistance, easily meeting MIL–C–5541, and provides excellent paint adhesion.

More than likely, Iridite can save you money and give you better finishing results than your present method. Discuss it with your Allied Field Representative. Or, write for literature.

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A NEW CLEPO FINISH FOR WROUGHT AND EXTRUDED ALUMINUM ALLOYS.

SAT-N-MASK is just what its name implies: a finish smooth as satin, so finely etched it masks all surface imperfections.

USE Sat-N-Mask as a decorative finish. It's beautiful in contrast with buffed or painted surfaces. Ideal for name plates and dial faces, for reflectors, or wherever diffuse reflection is required.

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USE Sat-N-Mask to give any combination of aluminum alloys a uniform white matte finish.

USE Sat-N-Mask to save time. Never before has such a fine matte been possible through chemical etching, bulk processing.

SAT/N/ MASK

FOR APPEARANCE

Ask for details from your nearest Clepo Field Representative.

FREDERICK GUMM CHEMICAL CO. INC.
538 FOREST STREET
KEARNY, NEW JERSEY

gence in the matter is greatly appreciated.
"W" — Washington

MM—This metal pump was advertised in Modern Metals in February, 1960. For details write W. Weil, Metal Pumping Services, Inc., Box 3991, Cleveland 20, Ohio.

Price Cuts; Good, Bad or Terrifying?

Sirs:

The front cover last month, in which Modern Metals ran imaginary 1962 metal headlines, was clever. We particularly liked the headline: "Russians Buying U. S. Aluminum; Need More for Building."

Sometimes too many of us get so far in the forest we get lost — particularly on this price cutting problem. A jolt, such as those scarey headlines on your cover, is frequently good medicine for many of us. . . .
"L" — New York

Sirs:

When the price of aluminum was cut 2 cents a lb., the stock market reaction was so severe that you thought the aluminum producers were going out of business. Yet I detected a marked correction (upward) soon after you published the details in the "Looking Ahead" pages last month.

I am wondering whether many brokers, or investment firms, read Modern Metals — or whether this was just a normal market correction after the smoke was cleared?
"W" — Michigan

Sirs:

. . . In your analysis of the aluminum price cuts, you failed to include the fact that U. S. producers cut the price of re-roll ingot. Don't you believe this was one reason why Aluminium Ltd. initiated the cut?
"J" — Pennsylvania

Sirs:

To get right to the point, does Modern Metals believe the new low aluminum prices will move more metal next year?
"P" — California

Sirs:

. . . You must have huge circulation in Europe! Ever since Modern Metals started discussing price cuts, concessions, commodity prices, etc., firms over here have been asking for similar deals, extended credit, promotional support and even protection.

In some quarters, things are in one hell-uva mess. Maybe we should buy up all "export copies" of Modern Metals and dump them in the ocean.
"C" — England

Sirs:

Your analysis of the price cuts, of possible future prospects, and what to expect in the way of aluminum firms' earnings leaves something to be desired. As an analyst, I simply cannot go along with you. . . .
"B" — New York

MM—In our effort to figure out why it happened, possible benefits, and the immediate loss, if any, we expected plenty of controversy. We got it. Our feeling was that we'd better be 80% right or there'd be a lynching. But the overall reaction has been mild. Actually, with a month to reflect on the subject, and after listening to those who disagree, and reading the mail, we'd handle it about the same way. Only time will tell.

For those who didn't see this analysis in our October issue, we've a few reprints left. Our vice president in charge of complaints, bomb threats, and floating crap games will be glad to send copies as long as they last.

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MARKET DEVELOPMEN
PROMOTION AND
ADVERTISING MAN

Fifteen years' experience
aluminum, steel, copper
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Will relocate.

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Wanted:

Manufacturers rep to sell anodizing work on curtain walls and expanded metal.

Clear colors.

Maximum dimensions: 4½ feet by 10 feet.

Midwest area.

Automatic Anodizers Co
3340 W. Newport Ch
Phone: IR 8-3340

Wanted:

Roll Forming Mach

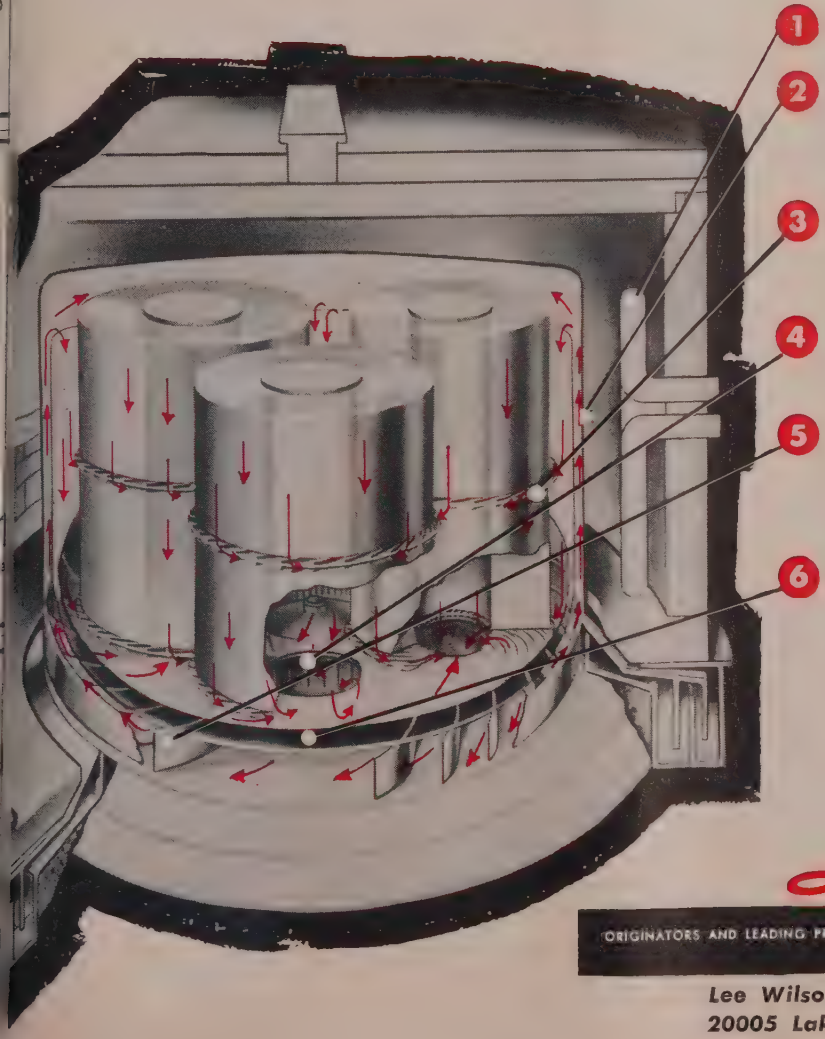
12 station, with flying cut-off, to take material up to 16-inches wide.

BOX 481 • Cranford,

The Lee Wilson HIGH CONVECTION ANNEALING System for non-ferrous metals has been developed by Wilson engineers to give producers the most efficient annealing operation possible. This fully tested annealing system produces a product of brightest color, uniform physical properties, at unparalleled speed and unmatched low cost.

From dome to base, the furnace is a thoroughly engineered product by America's foremost furnace builders. Six major engineering accomplishments provide the reasons why the Wilson HIGH CONVECTION System delivers such efficient, rapid and uniform heat application to the charge.

)N-FERROUS
NNEALING AT ITS FINEST



1. **THE SOURCE OF HEAT**—"O" type radiant tubes with inputs up to 5 million Btu. per hour.
2. **THE HEAT EXCHANGER** — The patented double wall inner cover where velocities of over 6,000 ft. per minute transfer the heat evenly and rapidly from inner cover surface to the charge.
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4. **THE ENERGY SOURCE** — Fan drives using as high as 25 HP motors, with delivery up to 14,000 cfm. at 8" static pressure—(cold).
5. **THE ENERGY CONVERSION UNIT** — The diffuser assembly where the velocity pressures from the fan are converted to static pressures and directed into the inner walls at twice the normal fan efficiency of other furnaces.
6. **THE PLENUM CHAMBER**—In order to apply the full convection system to several stacks of material using convector plates in each stack, a plenum chamber is superimposed over the diffuser assembly with suitable openings to allow the gas flow from all stacks of coils to return to the fan wheel.

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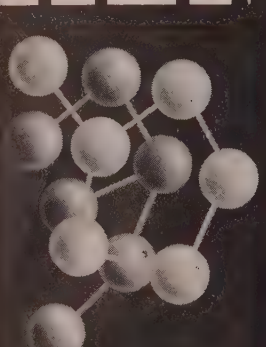
20005 Lake Road, Cleveland 16, Ohio

WHEN DIMENSIONAL STABILITY OF CASTINGS IS CRITICAL... SPECIFY

ALMAG 35



STABILIZATION AT 700 F. PROVIDES ABSOLUTE STRESS RELIEF AND DIMENSIONAL STABILITY WITHOUT LOSS OF PROPERTIES OR MACHINEABILITY.

Dimensional instability in aluminum alloys results from permanent growth and locked up stresses. Aluminum silicon alloys may be degrowthed by heating to 450° F. and complete stress relief is obtained by heating to 700-800° F. However, most aluminum alloys subjected to that treatment become soft, have low physical properties, and are not machineable.

In contrast with age hardened alloys, Almag 35 is an aluminum-magnesium casting alloy which immediately as cast has full high strength and high shock resistance, retaining these properties for the life of the casting. Because of its composition, it is not subject to growth on heating... and when heated to 700-800° F. for five hours and cooled in still air becomes dimensionally stable and at the same time retains its full hardness, physical properties and machineability.

Therefore, Almag 35 is the ideal alloy for casting components of instruments, computing devices, and other equipment where dimensional stability is of prime importance.

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WILLIAM F. JOBBINS INCORPORATED

P. O. BOX 230C
AURORA, ILLINOIS

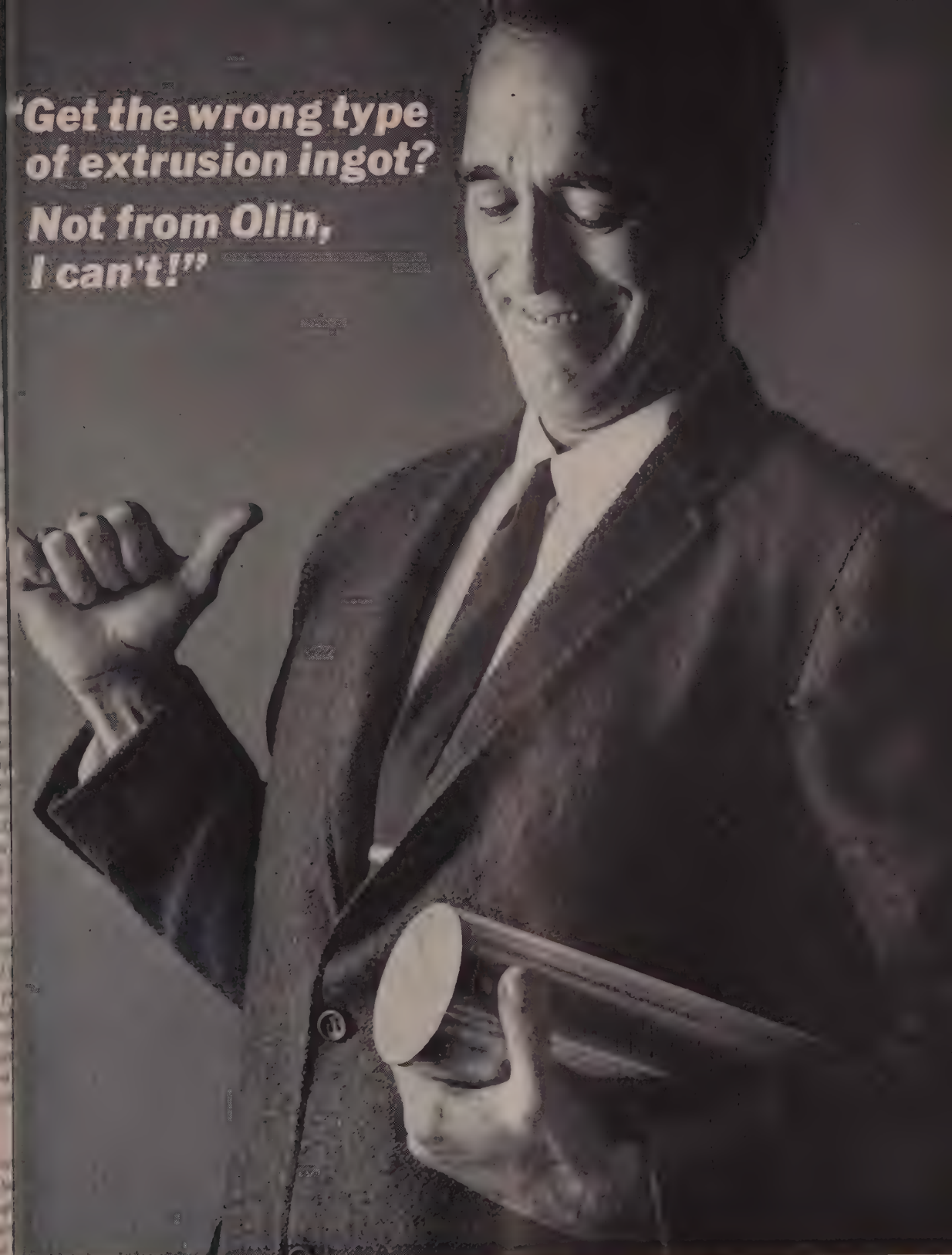
DISTRIBUTED IN CANADA BY ALUMINUM COMPANY OF CANADA, LTD.

Here and Ther

Pampered Packers « « We don't mean the f team in Green Bay. We're referring to the pac citrus juice concentrates. The imaginative eff the aluminum producers — particularly Reynolds forced can makers to trim their prices, and stee to develop low priced thin tinplate. The packe the benefits in better cans at lower prices. Some o are going 100% aluminum this season; other taken to thin tin. The aluminum producers ex corner 80 to 90% of the market; some packers say get no more than half. Either way, the real w will be the packers and the consumer. Now, Re has its eye on other can markets; has swung a d der which it will buy, use, and lease to can mak continuous forming and welding equipment o Rochelle (N.Y.) Thermatool Corp. This machi bat out welded aluminum can bodies at an asto rate, and the weld is strong enough to withstan packing. Maybe Reynolds is aiming at the 9-billi beer biz.

Roll Formers Rebuffed « « Manufacturers forming machines will not be allowed to exhibi wares at the NERSICA (home improvement contr show in New York this year. Richard R. Whi association's managing director, complained abo racket made by such machines, then cited the ma jection: "The vast majority of exhibitors at th are offering products that the contractor or rem will buy as a unit and then install himself," Wh clared. "The manufacturers of roll forming equi are seeking to make manufacturers out of deale This would in effect make the dealer a competito most exhibitors at the show." In other words, NE exhibition space will not be used to proselytiz petitors in the aluminum siding biz. We don't the siding makers for trying to squelch newcome business is competitive enough now. But this won't keep dealers from leasing roll forming ma and making their own siding. We would rath NERSICA — and all other associations involved siding game — devote more effort to internal p of product quality and sales methods in the in A trend to regional manufacturing looks inev and the big danger is that many of the newcome turn out shoddy products and use unscrupulous stering methods that will besmirch the reputat the entire industry.

Pennsy, Please Note « « Aluminum contin edge its way into the railroad rolling stock bu ever since The Southern Railroad placed its hug for aluminum cars (see MM, July '60). Nothin sensational has happened since, but we note that Trunk Western Railroads has standardized on num roofs for its boxcars. Three years ago, Trunk installed the light metal roofs on 300 car first non-experimental order. And just recen railroad ordered aluminum roofs for another 200



hen I called Olin for extrusion ingot, they didn't just write down the order—they started ng all sorts of questions about the end product, desired finish, strength, and so on—and a veteran extrusion specialist to help me produce a better product, faster. Just nosy? Olin! They know that every extrusion shop has variations that can mean the difference veen profit and loss. There's an Olin extrusion ingot available for most every type of luct or extrusion problem and Olin took the time to make sure I got exactly the metal lly needed." Nobody thinks in aluminum better than Olin—from alloys to marketing.

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Better ALUMINUM Extrusion
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This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

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GRAPHITE PRODUCTS CORPORATION manufactures metal working dispersions for the newer metals and alloys. Each formulation has been developed for a specific application. Factory testing has shown that some of our compounds can be used successfully in many different operations. Bulletin 581 briefly describes some of these products and their uses.

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Extruding
High Temperature Lubrication
Parting
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Drawing

Descriptive literature and working samples on request.

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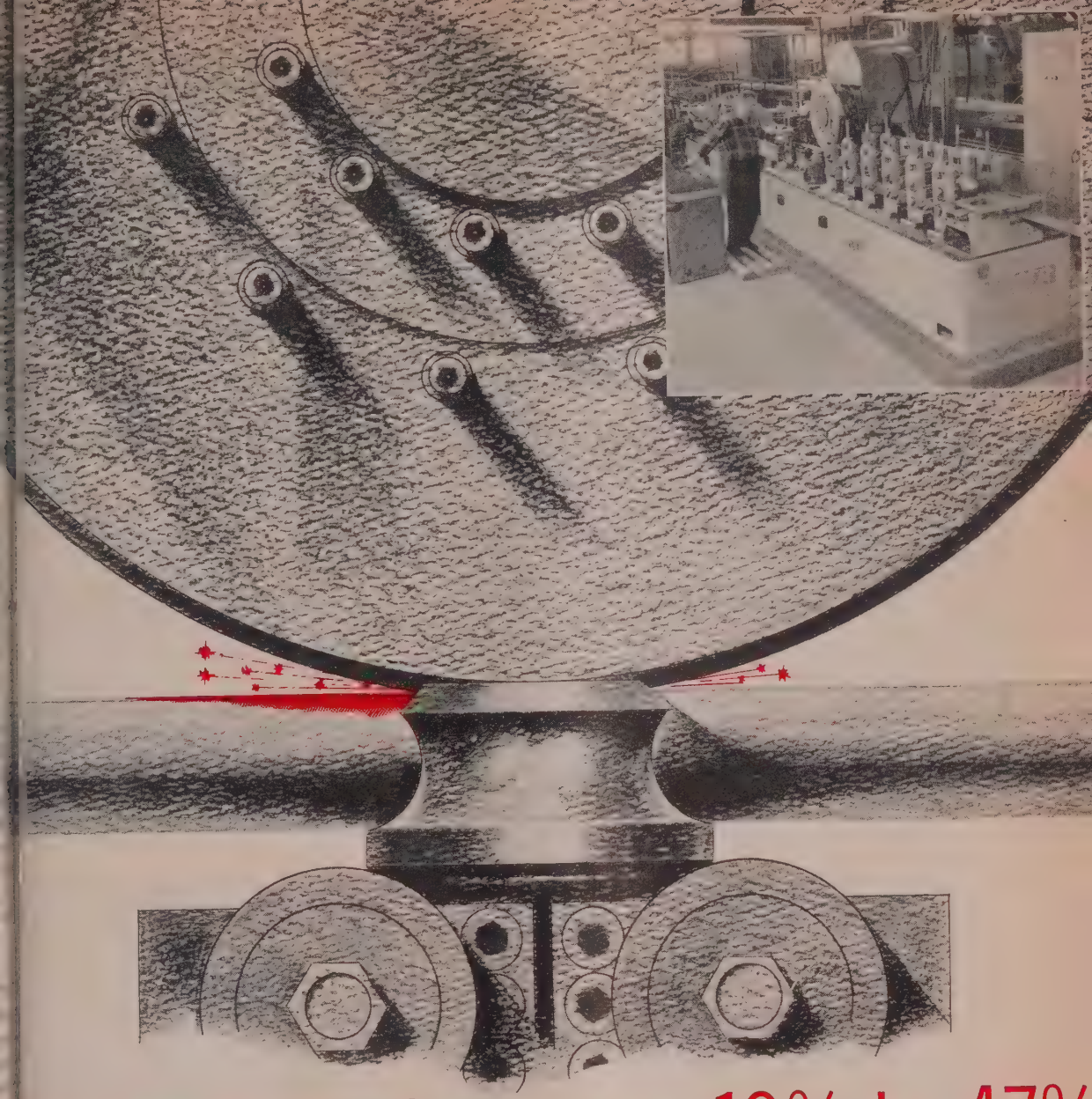
BROOKFIELD, OHIO

a job that will take better than 165,000 pounds of A aluminum sheet. The aluminum roofs are corro resistant, heat reflective, and weigh 1250 pounds than steel roofs. Roof sections fabricated by Stan Railway Equipment, Hammond, Ind., will be deliv to the car builder, American Car & Foundry. Each package consists of 12 flanged sections stamped f .081-inch sheet. Flanges adjoin to form 11 seams w are sealed with formed aluminum caps. Two end pi are modified to overlap car ends. Grand Trunk's inal 300 roofs are in good shape after three years' e sure, attesting to aluminum's suitability in this app tion. But, we can't help wondering why such gian the Pennsylvania RR, the New York Central, and B & O continue to shun aluminum. If they're af they'll lose some of the steel industry's shipping ness, we would like to know exactly where such busi could go.

Aluminum + Stainless « « The Atomic En Commission has come up with a flux-free metho making durable, gas-tight bonds between alumi and stainless steel. Here, briefly, is how it works: S less steel is cleaned with an abrasive, washed in chloroethylene, coated with a water-HCl solution, heated to 450°F, tinned with a 50-50 lead and tin sol and rinsed with hot water to remove any residual The aluminum is similarly cleaned and washed, heated to about 650°F, then tinned with a commerci available solder containing about 1% silver, .01% minum, .01% copper, 1% iron, 1% lead, .1% sili and the balance tin. The two treated surfaces are placed together and heated to 500-600°F with an acetylene flame. The two different solders unite rea to form a gas-tight joint. For more dope, write to U. S. Department of Commerce, Washington 25, D (Office of Technical Services) and ask for HW-68 Be sure to include a check for 50 cents.

Britain's Bungalows « « They've got an alert minum association in England. When the Hou Ministry announced recently that some 70,000 prefa cated alumium bungalows would be torn down, Aluminium Development Association swiftly dispatc a press release, well worded to allay any fears that minum was less than suitable as construction mate The houses had been erected shortly after the wa alleviate the serious housing shortage and at the s time provide employment for displaced aircraft work Aircraft alloys, high in copper content and relati low in corrosion resistance, were used. A thin cladc of pure aluminum on sheet has stood up well, but unclad extrusions have shown some evidence of we ering. ADA's press release pointed out these and o factors, and further stated that "when aluminium the right grade is correctly applied to building con nents in accordance with recognised practice, enti satisfactory service is achieved." The ADA also n that "Many of the temporary bungalows have now ceeded by a considerable margin their stipulated and examination of a number of them during plan dismantling disclosed comparatively little deteriora even under the worst conditions." We doff our ha our colleagues at ADA.



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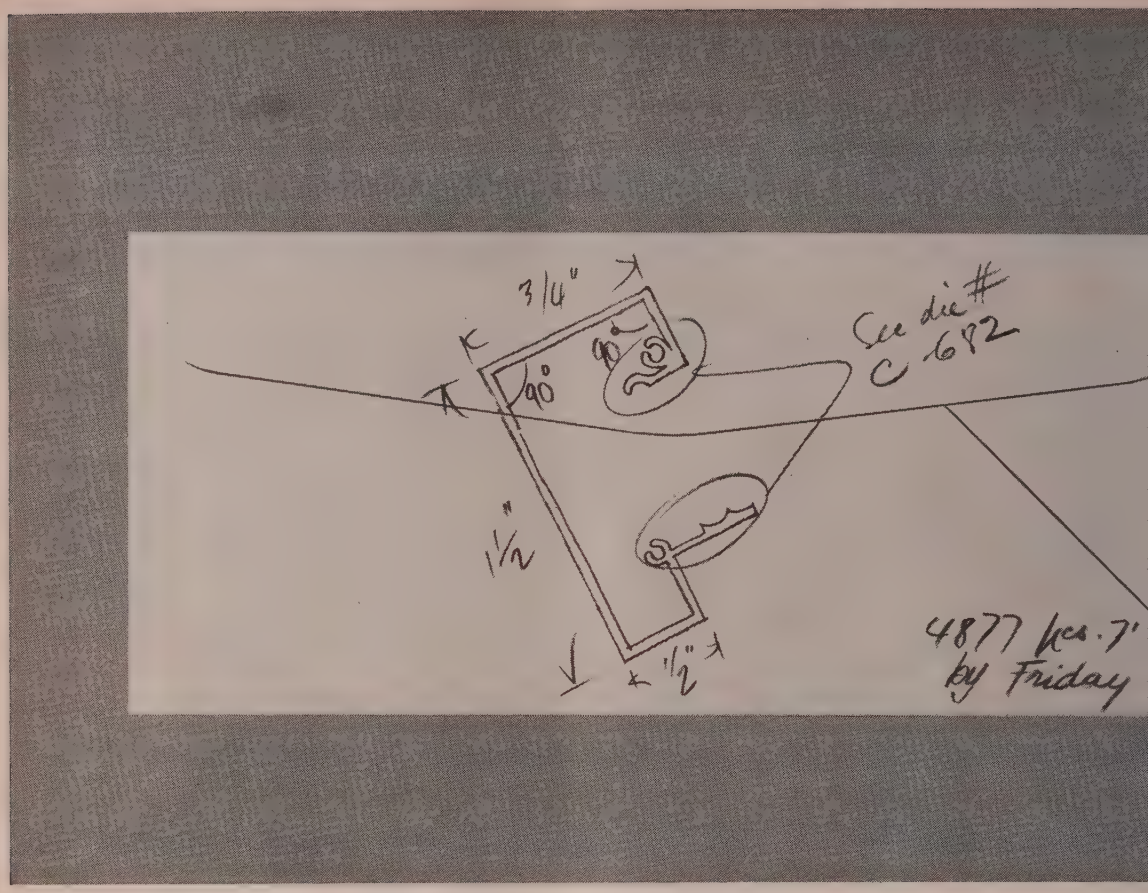

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Please send me a list of Independent Extruders in this area.

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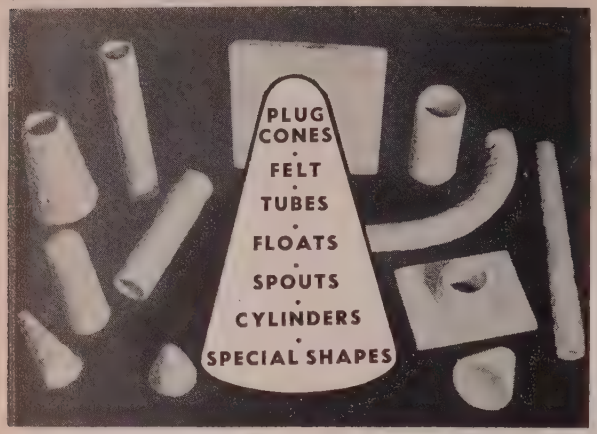

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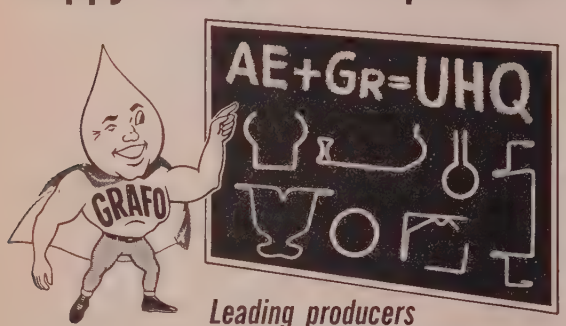

Leading producers of extrusions use GRAFO

Many manufacturers of aluminum extrusions already know the basic answer. It's simply this: *Aluminum Extruding* plus *GRAFO* equals *Uniformly High Quality!*

Why? Because GRAFO Colloidal Graphite dispersed in water reduces die wear, prevents sticking, gives better metal flow and improved production. *Send for booklet "The Biggest Ounce of Protection"*

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Useful Data

Magnesium, aluminum and titanium design cha teristics and data are discussed in a "Light Metals D Book" published recently by Brooks & Perkins I 1950 W. Fort St., Detroit 16. The 44-page book sents a broad range of charts and tabular informat designed to aid the designer or engineer in the selec of light metals. Ralph Gillespie will mail the boo to engineers and designers on request.

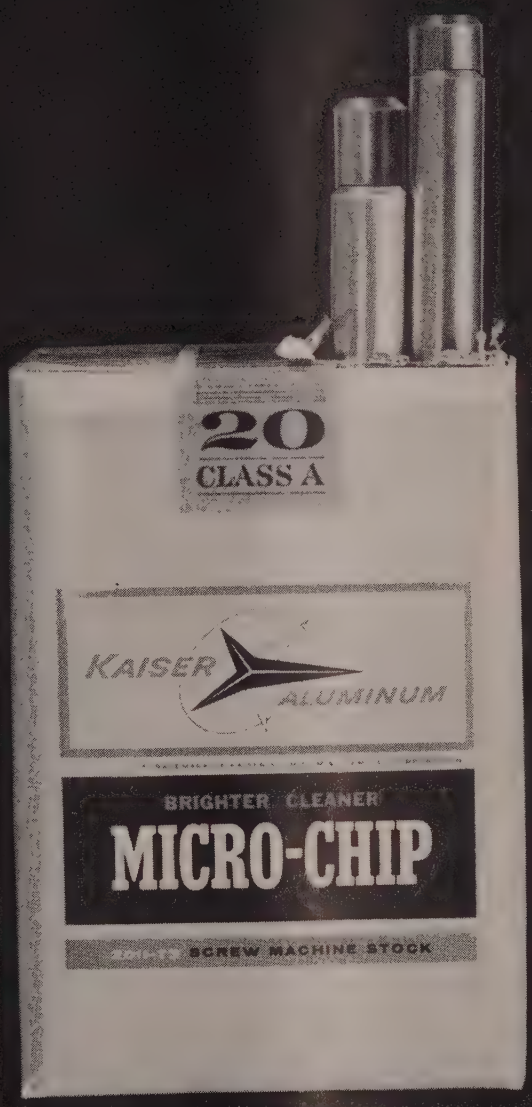
A **filtering system for rolling mill** cooling oil is scribed in a new booklet produced by Gale Separa Co., Div'n of Infilco, Inc., P. O. Box 5033, Tuc Ariz. Bulletin 9030-A is titled "The fully Autom Gale "SA" Diatomite Type Filter," and is most tailed in describing these compact filter systems are available in sizes from 25 up to 500 square fee filter area per single unit. Write to Guy Thack for this 16-page booklet.

Solid aluminum etchant in 600-pound drums is subject of booklet MP-621 by Pennsalt Chemicals C Main purpose of the brochure is to explain that etchant, AE-16S, is economical when bought in l drums. One case history points out how savings are complished. A special section tells the extra ben of using the drums, such as push-button control, d lessness, no heat of solution, uniform increase in centration. Final portion of book describes fi specialized program for aluminum fabricators. W R. S. Lee, Pennsalt Chemicals Corp., 3 Penn Cer Philadelphia 2, Pa.

Plasma flame cutter for cutting nonferrous and rous metals is detailed in bulletin C101 by Ther Dynamics Corp. The cutting head is diagrammed theory of operation is explained. Thickness of var metals which can be cut is given, along with spee cutting obtainable. One chart shows comparative erating costs of a plasma flame cutter and an oxy- torch; another chart compares cutting speeds of two methods. Book is obtainable from J. A. Brown Thermal Dynamics, Mechanic St., Lebanon, N. H.

Pre-formed ceramic cores used in making com castings are described in a reprint prepared by S wood Refractories, Inc. It describes how ceramic c enable investment casting producers to meet the t specifications demanded in hollow castings for air and space craft, and how ceramic cores can pro complex configurations without design compro Illustrated are the close gage inspection that ca made when desired, and the manner of positioni ceramic core in a pattern die. Write to H. A. Ung Sherwood, 16601 Euclid Ave., Cleveland 12, Ohio.

Architectural veneer—porcelain enamel on alumi or steel for curtain wall panels — is described and oughly illustrated in a booklet by Ingram-Richar Manufacturing Co., Beaver Falls, Pa. Twelve pane signs, including a new 2-hour fire-rated panel, are



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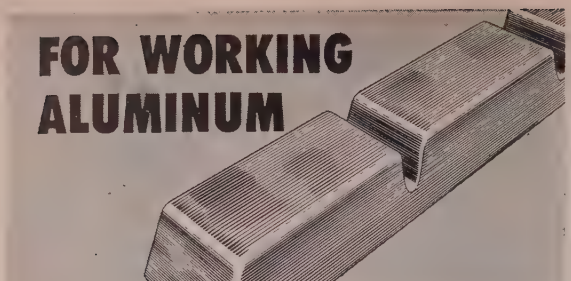

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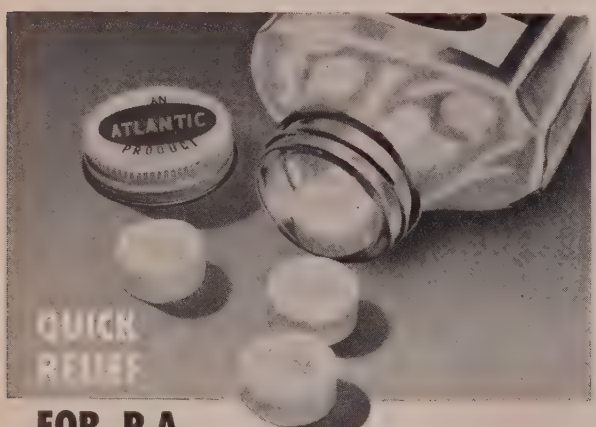

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tured. Details also are presented on multi-color pa designs, custom design panels, big-panel construct curtain wall remodeling, and special veneer compone Ask J. F. Ingram for copies of the new brochure.

Welding problems are answered in a 60-page Ap cation Manual published last month by All-State W ing Alloys Co., Inc., 249-55 Ferris Ave., White Pla N.Y. The manual gives more than 1000 uses of speci alloys for all types of welding, brazing and solderin aluminum, magnesium, copper, bronze, stainless st cast iron and other metals. Specific applications listed opposite the proper alloy selection, whether i an electrode brazing rod, solder, or All-State's lin Spoolarc welding alloys. Write to Richard H. Mar for this manual.

Hydraulic trim presses are described in a new bu tin (TP900) recently prepared by B & T Machinery division of Greenlee Bros. & Co. There is a comp table of specifications for two 20-ton models, one tonner, a 30-tonner, and six 50-ton models. The fol details the trimming operation and explains the va of B & T's "low pressure air-over-oil" principle, whic claimed to save production time. Part of the broch describes the Greenlee-B & T line of die casting chines. Ask Budd A. Reesman for this bulletin.

PPG Products, a magazine published regularly Pittsburgh Plate Glass Co., features aluminum resid tial siding in its current issue (Vol. 69, No. 3), shows how PPG's thermo-setting acrylic, Duracron suited for long lasting siding finishes in a variety colors. "In less than two years, seven of the top manufacturers in the country have switched their duction to Duracron," the article reports. A copy this handsome 32-page publication, showing many o applications of PPG products, is available from Zipprich, Pittsburgh Plate Glass Co., 1 Gateway Cen Pittsburgh, Pa.

"Contoured" holder blocks produced by Ajax and Forge Co. are described in a new brochure. flame trims shapes and rough milling cavities to re weighing size and weight. The folder graphically scribes the six steps taken by Ajax in the productio more economical holder blocks. Write to J. W. F later, Ajax Steel & Forge Co., 205 Adair Street, troit 7, Mich.

A new cutting and grinding lubricant is describe a folder prepared by D. A. Stuart Oil Co., 2727 S. St., Chicago 23. Included in the folder on Stuart's Solvol 900 water-mix lubricant are job application ies, cutting characteristics and benefits, and a samp the product. For a copy write to the sales mana

Threaded aluminum pipe fittings produced by trobe Foundry Machine & Supply Co., Latrobe, are detailed in a new 6-page catalog. Types, styles sizes available are illustrated and listed in size ta The fittings are made in hundreds of stock sizes styles and sold through distributors in principal c Address the sales manager for this catalog.

THIS HIGHLY SUCCESSFUL ALUMINU
MELTING FURNACE FEATURING MONO-
LITHIC CONSTRUCTION WAS BUILT
ENTIRELY OF HARBISON - WALKER
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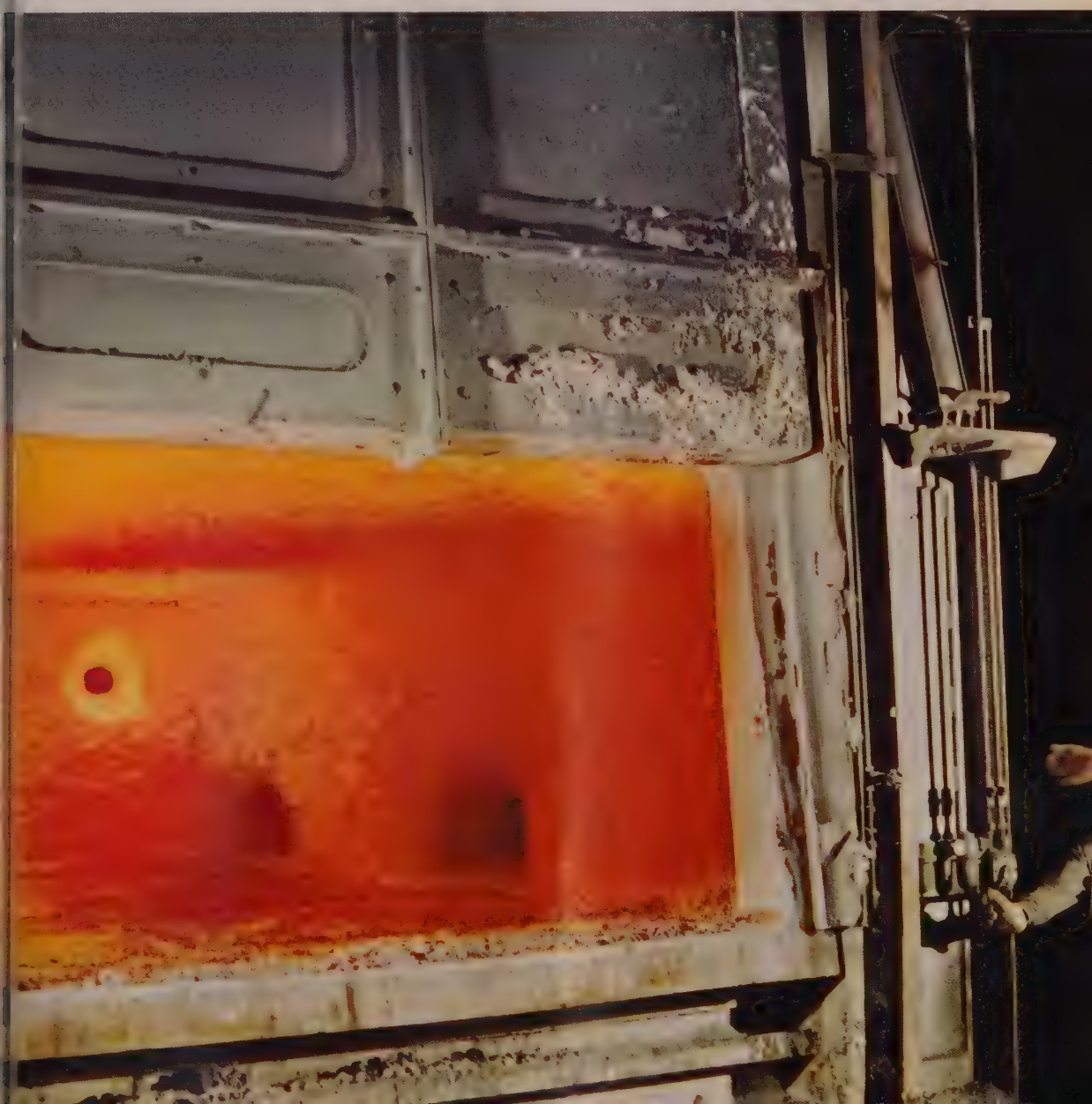
Construction and product details are given on the following page. PHOTO: COURTESY OLIN-MATHIESON CHEMICAL CORPORATION



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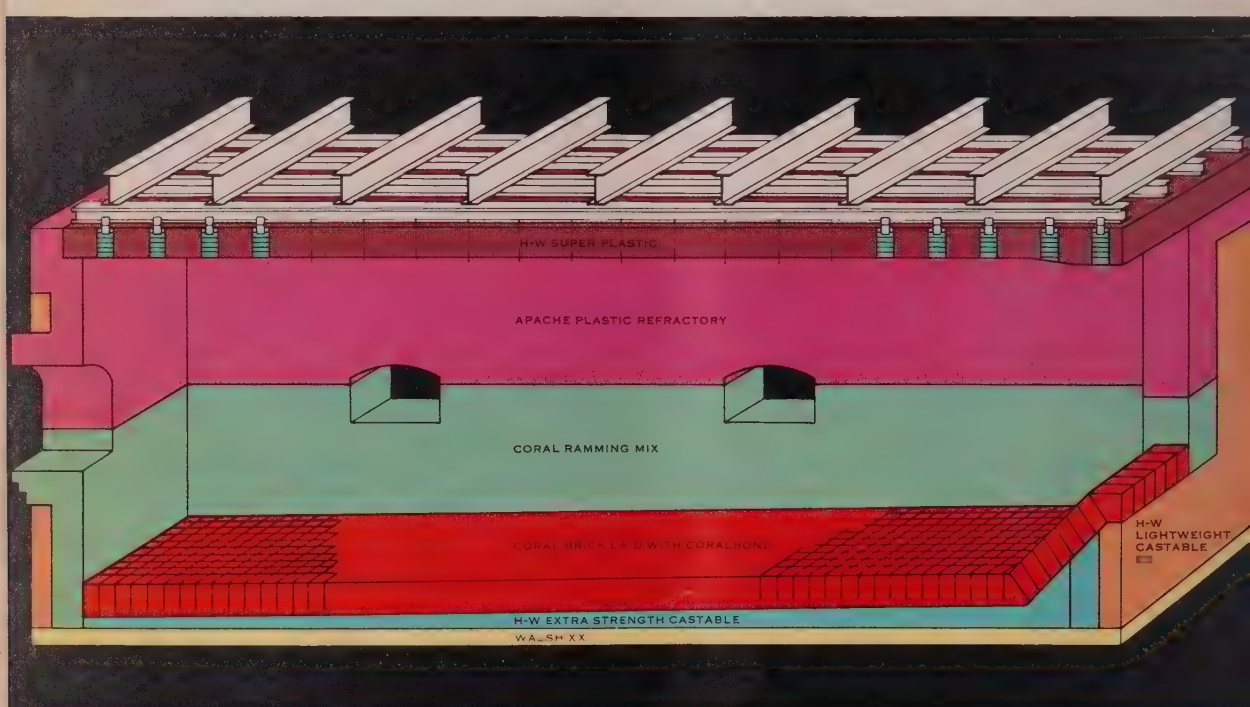

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A refractory concrete of outstanding physical strength.

CORAL brick, laid with CORALBOND

These specialized high alumina brick and mortar have exceptional high strength to withstand spalling and slagging influences, and provide remarkable resistance to molten metal reaction.

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This companion product to CORAL brick and CORALBOND, installed by gunning or ramming, has excellent resistance to molten aluminum alloys and develops great strength at operating temperatures.

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An insulating monolith.

APACHE PLASTIC REFRACTORY

A high alumina (60% monolith with refractorine equal to brick of this cla but with much lower pe meability.

H-W SUPER PLASTIC

A monolith with very goo workability and refracto ness equal to superdu brick.

WRITE FOR DATA — Complete product descriptions and test data are available showing the superior resistance of these refractories to aluminum alloy reaction.

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HW 6

lew Enterprise

$5 million contract for the production of compo- s for Zuni rockets and Sidewinder missiles has awarded to the Bridgeport Brass Co., a division lational Distillers and Chemical Corp. Bridgeport s, at its Riverside, Calif. plant, has pioneered the lopment of **aluminum motor bodies** for these ons, using the cold forging process.

eorge Sall Metals Co., will expand its **nonferrous lting facilities** at 2300 E. Butler St., Philadelphia. e 20,000 square feet of space will be added to the ting plant, and a new 100,000-pound capacity re- eratory furnace will be installed, according to com- y president, George Sall.

wo more holding furnaces and a vertical direct ing machine which will produce **5000-pound in-** will be added to the Longview, Wash. reduction t of Reynolds Metals, Co. The additional equip- t will be installed in the plant's recently expanded house, which contains three new furnaces, a hori- al casting machine, sawing equipment, and homog- ing facilities.

cold rolling mill, to be used to fabricate **roofing siding sheets** of aluminum and galvanized, has installed in the plant of Nesco Aluminum, Ltd., ina, Saskatchewan, Canada. The $50,000 mill has installed in a nearly-completed $125,000 plant. co has offices in Vancouver and Calgary.

bout $750,000 is being invested in the 30,000 square addition to the permanent mold aluminum found- f The Zollner Corp., Fort Wayne, Ind. Zollner luces **aluminum pistons** for heavy duty trucks, pas- er automobiles, and industrial equipment, as well ther permanent mold cast aluminum products.

nemical Contour Corp. is doubling the size of its ent plant facilities at Gardena, Calif. – the second or expansion of the plant this year. The chemical ing concern was recently awarded a $600,000 con- for milling **aluminum wing components** for the ng 727 commercial jet transport; will devote about 00 square feet of the additional space to this work. remaining 20,000 feet of new space will handle e 20 other aircraft and space projects.

ohn Aluminum & Brass Corp. is augmenting its king and warehousing facilities at its plant in Dan- , Ill., boosting total plant area to 181,000 square The facility builds **heat transfer equipment** for ing, air conditioning and commercial refrigeration ems. Other products include custom made evapora- and condenser coils for the OEM trade, as well as a dard line of coils and units for wholesalers and air litioning contractors.

aiser Aluminum International is broadening its **activities in Europe,** having opened new sales es in Rotterdam, Holland, and Birmingham, Eng- . The Rotterdam office, at Coolsingel 75, will be

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Parts big or little, many or few

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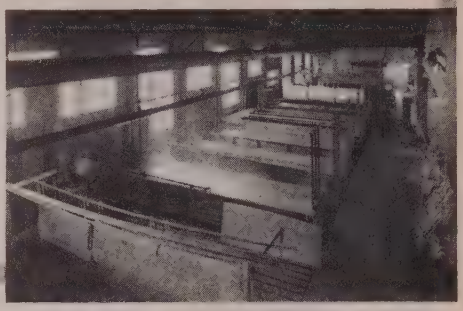

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Pick-up, die lines, inclusions, blisters, mean rejects. Kerns United helps eliminate these extrusion problems on the most intricate aluminum shapes.

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PERSONALIZED LUBRICANTS FOR INDUSTRY

managed by Hans Schwengler, while A. P. Hilliam will be in charge of the Birmingham office at Lichfield House, Ringway.

Contracts for the production of **titanium and steel rocket chambers** for the Air Force Minuteman intercontinental ballistic missile have been awarded to Avco Corp.'s Lycoming Division, Stratford, Conn. The division recently built and tested the first titanium chamber for the missile's second stage; will employ its hydrospinning, 3-dimensional machining and closed circuit TV welding facilities in the work.

Titanium and zirconium tube and rod, manufactured by Wolverine Tube, Division of Calumet & Hecla, Inc., Allen Park, Mich., will be distributed by Williams and Company, Inc., 901 Pennsylvania Ave., Pittsburgh 33. The distributor, with warehouses in Pittsburgh, Cleveland, Cincinnati, Columbus, Ohio, and Toledo, Ohio, will sell the materials in five north central states.

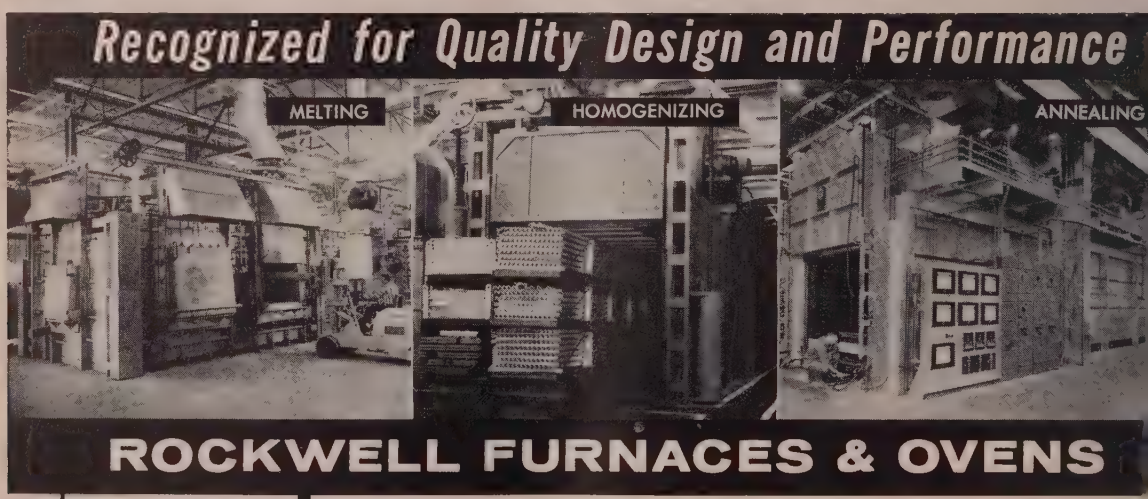
Metal finishers in the midwest, West Virginia and western Pennsylvania can now obtain the Kenvert line of **finishing compounds** from Northwest Chemical Co., division of Chemetron Corp., 9310 Roselawn Ave., Detroit 4. The Kenvert line of chromates, brighteners, bright dips, deburring solutions and protective dips is produced by Conversion Chemicals, Rockville, Conn.

A new Heavy Equipment Division was created recently when E. W. Bliss Co. consolidated the operations of its Salem and Canton facilities in Ohio. The new division will build the company's complete line o **ing mill equipment,** heavy mechanical and hyd metalworking presses, large custom machinery an cial contract items. Corporate headquarters o E. W. Bliss Co. will remain in Canton, Ohio.

Mill products produced by Harvey Aluminur be sold in Kansas and southwest Missouri by sales office set up at 103 Koch Building, 321 W. Do Wichita, Kansas. Harvey produces titanium, zirc and other special metal products, as well as **alun mill products.**

R. D. Werner Co., Inc., extruding firm at Gree Pa., will add 53,000 square feet of operating space present plant for a total of 162,000 square fee **pansion plans** involve installation of special high equipment to raise Werner's output. The Werner ties also include equipment for the production formed stainless and aluminum shapes. The firm ders, planks, stages, scaffolds, metal trim and frames are distributed nationally.

Aluminum **additives** known as Master-alloy Hardeners are a new product line of Howe Re Corp., a subsidiary of Howe Sound Co. at Sev N. J. The additives will be in the form of piglet to four-ounce sizes) which are added to remelt ar mary aluminum. Titanium, chromium, mangan boron are available in conjunction with alun either individually or in various combinations.



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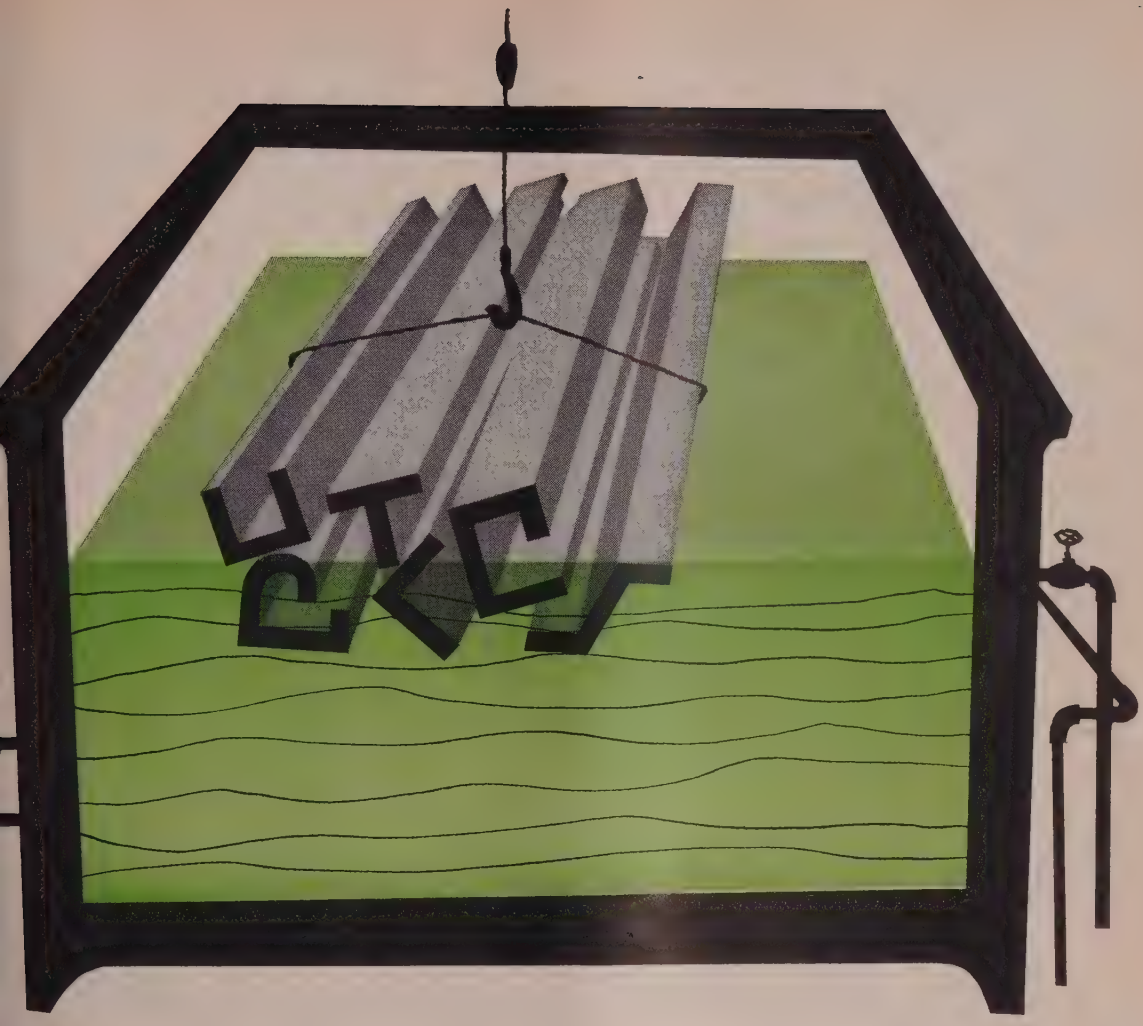

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In the '62 Model Year The Aluminum Industry Banks on Volume Sales

With no new application breakthrough in a this year, suppliers of aluminum must rely big volume of sales to keep metal consump at high level. Hope for new tonnage uses s as bumpers and wheels deferred 'til next y

by H. K. Darby, Associate Editor

NEVER before have so few auto makers offered such a wide variety of models to so many American motorists.

Seems that nearly every conceivable shading of buyer preference is being, or will be, catered to. This fall each manufacturer augmented its already bulging stable of models with new designs, carefully calculated to snare the hesitant, on-the-fence shopper. And Detroit's development wizards are busily grooming still more models for next year.

The Chevie II — smaller than the standard Chevrolet but bigger than the Corvair — made its debut this fall. Not to be outdone, Ford is bringing out a new Fairlane—sandwiched, size-wise, between the standard Galaxie and the compact Falcon. Ditto for the Mercury Meteor, which will take its place between the Monterey and the Comet.

And there's a new crop of "luxury" compacts to compete with last year's Corvair Monza, the F-85 Olds Cutlass, Buick's Skylark, the Falcon Futura, and the Comet S-22. This year's crop, boasting bucket seats, heftier powerplants, and gaudier interiors, include the Valiant Signet 200, the Lancer GT, and the Lark Daytona.

Inside observers see an outside chance that the industry will approach the second best sales record racked up in 1960 when 6,674,796 cars were sold. (But it will fall short of fabulous '55 when dealers peddled nearly 8 million cars.)

At any rate, sales seem sure to exceed sad '61, with its 20% dip in volume. With the nation's economy definitely perking up, motorists are loosening the purse strings and eyeing the new models with renewed interest.

In the battle for the consumer dollars some divisions have dropped poor selling models. Some have added new ones. Ford's Thunderbird line will include four new models, one of which looks like a two-seater when a plastic deck is used to cover up the two rear seats. Pontiac's highly successful Tempest compact has a few new models for '62, including a convertible. Oldsmobile reportedly has a new sports car model on the way.

The styling and model spread should be even greater in 1963, when Ford is expected to introduce its extra-small Cardinal, and when Chevrolet will bring out its directly competitive model. The next model year will also bring autodom's most radical design changes.

The aluminum engine holds its ground at Chrysler, General Motors, and American Motors, but Ford's engineering authorities still maintain it will be a long time before they go to aluminum. They cor that the consumer cares not a whether the block is iron or a num as long as the engine give performance.

Saddled with the industry's bi integrated gray iron foundry o tion, Ford has had to go fa than the other car builders in iron casting technology. Resu that its new "thin-wall" V-8 e is a more efficient power plant. reports that the new engine w 100 pounds less than the ori mass-produced V-8 introduce Ford in 1932, and produces the horsepower with the same placement.

New Engine Development

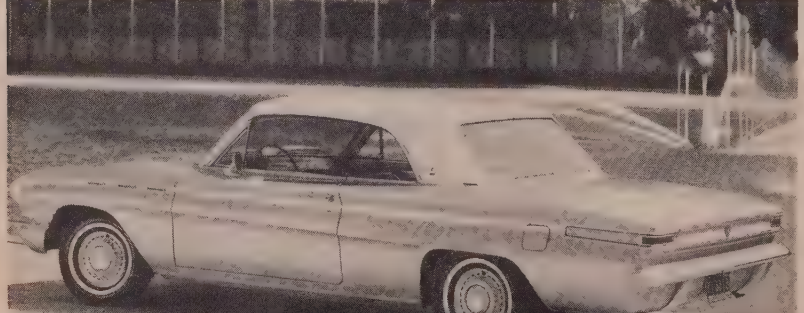
Oldsmobile's new limited pr tion sports car will have a aluminum engine that "will em a key principle of aircraft engin sign." However, this seems t General Motors' only new a num engine development, albe important one technologically. F-85 engine will be aluminum this year.

Buick Special will have a iron V-6 for its standard power in an economy line, keeping a num V-8s in two sizes in d models. Inasmuch as Buick to have assessed the 1962 situ as call for a cheaper model therefore a smaller gray iron b this decision might be conside set-back for aluminum.

Tempest's engine equipmen mains the same—choice of a cas 4-cylinder unit or the aluminum

Meanwhile, progress of th aluminum engine block is not *Ward's Automotive Reports.* hard-wearing high-silicon alum alloys don't offer the casting machinability of more conven alloys, but solutions to these other problems—such as ach compatibility of pistons and c ers—move steadily closer.

Alcoa has figured a $4 savi



■ *Buick Special for 1962 has a 185 h.p. aluminum engine in the Skylark, the top of the line (above), and a 155 h.p. unit in the Deluxe model (4-door sedan). But a gray iron V-6 block goes into the popular-priced model.*

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each 6-cylinder block by eliminating the liners, according to the Detroit newsletter, and Alcoa sees this figure increasing if one considers the elimination of other operations involving iron liners, such as cleaning, preheating and handling.

If and when the aluminum engine achieves supremacy in the U.S. auto industry, it will be conceded that Chrysler contributed much to the success of this continuing campaign of the aluminum industry. The smallest of the Big Three seems most dedicated to the effective use of the light metal, pointing out that it reduces costs for itself and its customers.

But Chrysler is making haste slowly in advancing its aluminum engine program. Following its successful use of about 12,000 6-cylinder aluminum blocks in 1961 Lancers, a production run of 60,000 225-cubic-inch, 6-cylinder aluminum engine blocks is scheduled for 1962 Lancers and Valiants. A 170-cubic-inch 6-cylinder cast iron engine will be the standard unit. Weight of the aluminum block is 74 pounds; the cast iron block weighs about 150 pounds.

The 12,000 engines built last year taught Chrysler a lot about aluminum's performance. Cars equipped with them were sold to companies, fleet operators and to some private owners. Dealers who sold the individual cars followed Chrysler's special instructions and worked closely with the private owners to maintain uniform service records. The same program was observed by the fleet owners. In all cases, service records for the 12,000 engines were IBM-taped.

After deciding that die casting was more desirable than permanent mold, Chrysler designed a block that would lend itself to die casting.

"Die casting permits engineers to combine optimum structural strength and rigidity, with minimum metal usage and weight," a Chrysler spokesman said. "Use of high casting pressure permits minimum wall thicknesses and more uniform sections, with efficient distribution of metal. This contrasts with the sand casting process where heavier sections are required to accommodate the limitations of foundry practice.

"Then, die casting provides a product dimensionally more accurate and consistent than previously provided by sand and permanent mold techniques; it offers better casting quality as a result of accurately controlled casting temperatures and pressures, and highly automated manufacturing and inspection techniques.

"Finally," the Chrysler engineer said, "the process allows engineers to specifically design the block so that it requires fewer casting and machining operations than a comparable cast iron part. The water jacket is automatically cored from the top of the block, eliminating the need for special sand cores. Oil galleries and tappet bores are also automatically cored, eliminating many drilling operations.

"Furthermore, since the surfaces of an aluminum die casting are very accurate, they generally require only a minimum of metal removal."

The aluminum alloy used for t block is about 84% aluminum, 11 silicon, 3.5% copper, and min amounts of magnesium, iron, zi nickel, etc. Harry E. Eriksen, pla manager of Chrysler's die casti plant in Kokomo, Ind., said: "V use a higher silicon-bearing all in block production in order to g greater fluidity and better fill."

Chrysler's die casting facility Kokomo is a highly efficient ope tion. Aluminum is melted in fo 30,000-pound, gas-fired furnac from which it is transferred to 2 000-pound holding furnaces a from these units to small Ajax ho ing furnaces at the die casting m chines. At no point do transf crucibles cross the path of outgoi finished products.

Broad Range; Low Volume

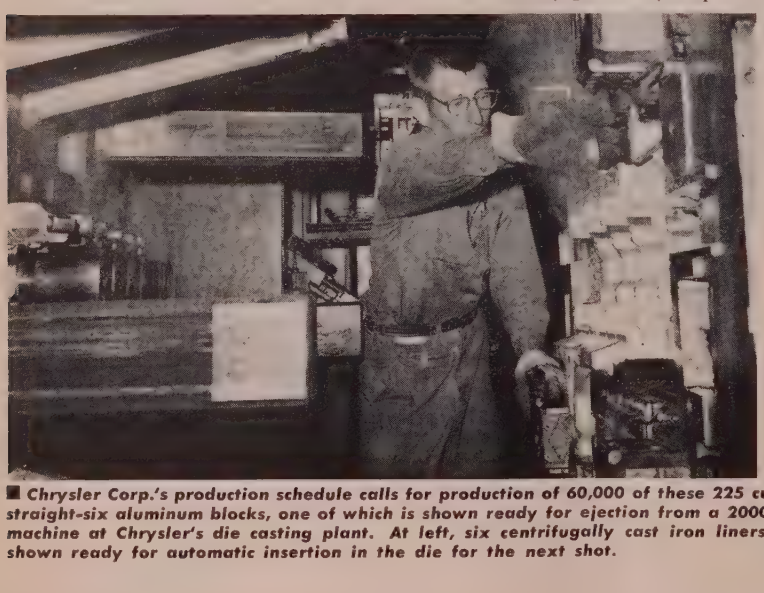
Chrysler has 53 die casting m chines (some B&T's but mostly C Master), ranging in size from 2 ton to 2000-ton. Besides blocks th produce transmission cases and tensions; clutch housings; steeri gear, starter, and distributor ho ings; oil and water pump bodi chain case covers; transmission va bodies; and other components—w over 50 parts for all Chrysler cars.

At present, two of the seven 20 tonners are producing the bloc The eight 1000-tonners are worki on transmission cases and extensio and other large components.

Block production is highly au mated. Cylinder liners are stack in big magazines like anti-aircr gun shells. They pass into A Magnethermic induction heat where they are heated to 780°F i order to make them compatible w the hot metal which is about 1200 This produces the proper desi stresses in the blocks.

One man runs each machine. F he sprays the exposed die with lub cant, after which he presses a butt which causes six liners to move e of the heater and be placed over mandrels in the die. The die is th closed off, the metal ladled au matically, and the shot made.

After ejection the blocks moved to trim presses where ris and plugs are knocked out. Mi flashing around the barrel is moved with a power hand tool volume increases, this operat



■ *Chrysler Corp.'s production schedule calls for production of 60,000 of these 225 cu. in. straight-six aluminum blocks, one of which is shown ready for ejection from a 2000-ton machine at Chrysler's die casting plant. At left, six centrifugally cast iron liners are shown ready for automatic insertion in the die for the next shot.*

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will be automatic). Shot blasting and deburring are final operations—deburring last because shot blasting has already done much to remove burrs.

The Kokomo plant's performance is regularly inspected by a Detroit headquarters group which makes a monthly quality audit by random checking of parts on the shipping dock. The casting plant's own quality control people conduct the same audit themselves, more frequently.

It's a good thing that the aluminum engine has developed so satisfactorily, because wheels and bumpers, the other weighty components that could bring a hefty boost in the auto industry's use of aluminum, haven't made much headway.

For a while last year it looked as though the aluminum bumper had gained an entering wedge. At the last minute, however, the big auto maker involved decided against a large production run and Reynolds Metals had to look to another year for acceptance of this application.

The Elusive Bumper

Alcoa, Kaiser and Reynolds have been conducting individual bumper development programs for several years. Alcoa and Kaiser bumpers would be formed from sheet—the former specifying an anodized finish, the latter offering a special chrome plating process. Reynolds' design is based on a heavy extrusion.

The primary producers advance this case for the aluminum bumper:

1. It would effect a 55 to 65% weight saving at front and rear of the automobile. By reducing bumper weight automotive engineers believe they can make improvements in the car's ride and cause the car to handle better. Suspension problems would also be eased, they say.

2. Aluminum bumpers *are* in use. Greyhound buses have had them since 1946. They have also been used on truck tractors which haul trailers over long distances. The Greyhound bumpers are stamped from .187-inch thick 6061-T6 aluminum alloy sheet and are anodized. Some European car makers, notably Panhard, use or have used aluminum bumpers. All the major U.S. car makers are continuing to test aluminum bumpers; they will not be used on 1962 production models, however.

Design's the Answer

3. Aluminum can be produced with the yield strength equal to the steel alloys used for bumpers. Both metals have the same basic strength problem in this application because bumper configuration (primarily a styling consideration) determines the type of steel or aluminum which must be used. If the configuration requires a severe draw, the metal (steel or aluminum) must permit forming at some sacrifice in strength.

Bumpers are a trim component and are designed to cushion impact rather than provide a rigid barrier to it. Automotive engineers believe rigidity is a disadvantage in a bumper and that the car and occupants will suffer less damage on impact if the frontal structure gives under severe stress.

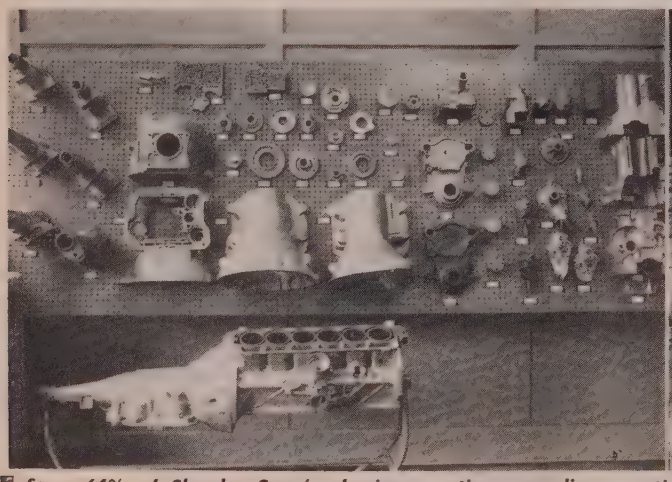
4. Aluminum isn't as far over t cost of steel for bumpers as mi be imagined. If components are c pared on a volume or area ba aluminum with its lighter wei often is cheaper. Long product runs enable the aluminum produ to offer auto makers a lower p for a part. The aluminum indu can be competitive with steel bumper production, but much depend on the finishing meth Kaiser Aluminum believes sav gained in its chrome plating pro will make the cost of its bum equal to steel.

The auto industry's growing terest in aluminum bumpers caused the major producer of s for bumpers to launch an anti-alu num propaganda campaign — so vitriolic that it will probab boomerang. The aluminum pe have decided not to become broiled. For steel, bumpers re sent a $40 million market, b on a 6 million car year.

Alcoa's View:

Alcoa had the last say: "We h no intention of engaging in a troversy over the comparative m of various materials for automo parts. It is enough to say that advances in the use of aluminum automobiles are the result of inherent qualities of the meta self."

In other areas, the give and between aluminum, stainless chrome plate continues. Merc 1962 Comet has an aluminum gr



Some 64% of Chrysler Corp.'s aluminum castings are die cast, shown lined up on this display board at the company's Kokomo plant. Permanent mold castings are being used only where some form of heat treatment is desired, such as the casting of high-strength pistons. However, a great many aluminum parts for Chrysler Corp. cars are stamped and extruded—grilles, bezels, scuff and sill plates, for instance. At right, aluminum blocks are shown undergoing inspection.

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After five minutes at maximum distance from controlled heat source, pan made of Fairmont Stainless Clad Aluminum, even though double thick, shows 290° F at side wall—in comparison with 230° F for copper core pan and 120° F for carbon core pan. Utensils furnished by courtesy of Vita Craft Manufacturing Company. The testing devices courtesy, Leeds & Northrup.

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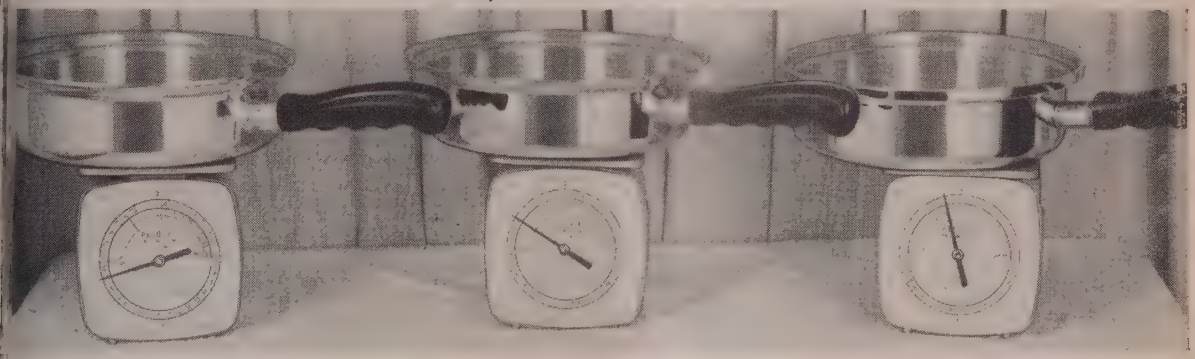

Fairmont Stainless Clad Aluminum
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Although twice as thick and correspondingly strong, the Stainless Clad Aluminum pan weighs up to ⅓ less than the copper core or carbon core pans. This means lower shipping costs. Also, increased sales appeal to Mrs. Homemaker, who will simply love a sturdy pan that's nevertheless easy to lift.

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NEWS FROM
LOMA

After an initial "breaking-in" period, this large LOMA slab casting and sawing installation is now in full production at the aluminum sheet rolling mill of the Quaker State Metals Company, Lancaster, Pa., a division of Howe Sound Company. Capable of producing six 7½ in. x 52 in. x 144 in. aluminum alloy slabs simultaneously, the LOMA semi-continuous casting machine turns out all the ingots required for the processing of sheet, strip and coil. From a quality point of view these continuously cast slabs are greatly superior to those formerly cast in conventional book molds, particularly since one of the methods by which the grain size of the cast material can be controlled is by regulating the casting speed.

For subdividing and trimming the 12 ft. long sheet ingots, Quaker State has also installed a LOMA high-speed circular saw capable of cutting through a 12 in. x 52 in. aluminum alloy section in about one minute. The sawing machine is of the overhead sliding carriage design and employs a 48 in. diameter blade cutting at a speed of 6000 ft. per min. The sawing installation includes a slab charging conveyor, an automatic length stop, a slab discharge conveyor and a chip removal unit. This fully mechanized stock handling equipment combined with the extremely fast feed movement of the saw allows a single operator to run the entire installation at a very high production rate.

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

■ ***Magnesium seemed to be making headway in Chrysler cars last model year. In '62, however, the only parts calling for magnesium are rotor and stator in the blower system of the heater. Doehler-Jarvis Div'n produces these die castings which total 1.9 pounds per set.***

and taillamp bezels as it did for this past year. New aluminum applications in the Comet are the rear end mouldings and the lower back panel applique, elected because aluminum is less expensive than stainless here.

Mercury Monterey grilles and lower back panel applique are also aluminum, again less costly than stainless in these uses.

"Our engineers are seeking ways of using new materials in our cars," a Lincoln-Mercury Div'n spokesman said. "They have selected plastics for some functional parts in 1962." He did not identify the parts.

Dodge Division has extended its use of aluminum to the automatic transmission housings of the Dodge Dart 8-cylinder and the Polara 500. This application is continued in the '62 Dart 6-cylinder and Lancer lines.

Lancer Has 100 Pounds

"New applications of aluminum are also seen in the manual steering housing of the Dart and Lancer, along with aluminum starter motor housings throughout the line," the company said. "The use of aluminum distributor housings has been extended to the 361 cubic inch engine in the Dart and the Polara 500.

Chrysler's use of aluminum for trim varies with styling changes, but a total of well over 100 pounds of aluminum go into the 225-cubic-inch Lancer equipped with automatic transmission.

The 1962 Dart has 69½ pounds of aluminum, including automatic transmission housing, transmission parts, clutch and torque converter housings, fuel pumps, carburetors and other engine accessories. Anodized aluminum is used in trim parts such as grilles, bezels and medal lions.

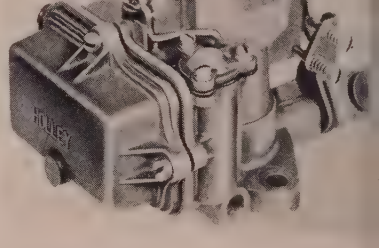
"Aluminum lost out to cast iro for intake manifolds on the Lancer and Dart six-cylinder models," Dodge Division man said. He at tributed the change to high cost o producing aluminum intake mani folds.

"Our engineers are very optimisti concerning the additional use o plastics in the future," he continued "Their improved properties giv more latitude in several areas o manufacture. Currently, plastic have found their greatest uses i trim and non-structural component These include heater housing steering wheels, wiring harness con nectors, and electrical insulation Plastics are also used in all types o interior knobs and handles, instru ment bezels and instrument faces.

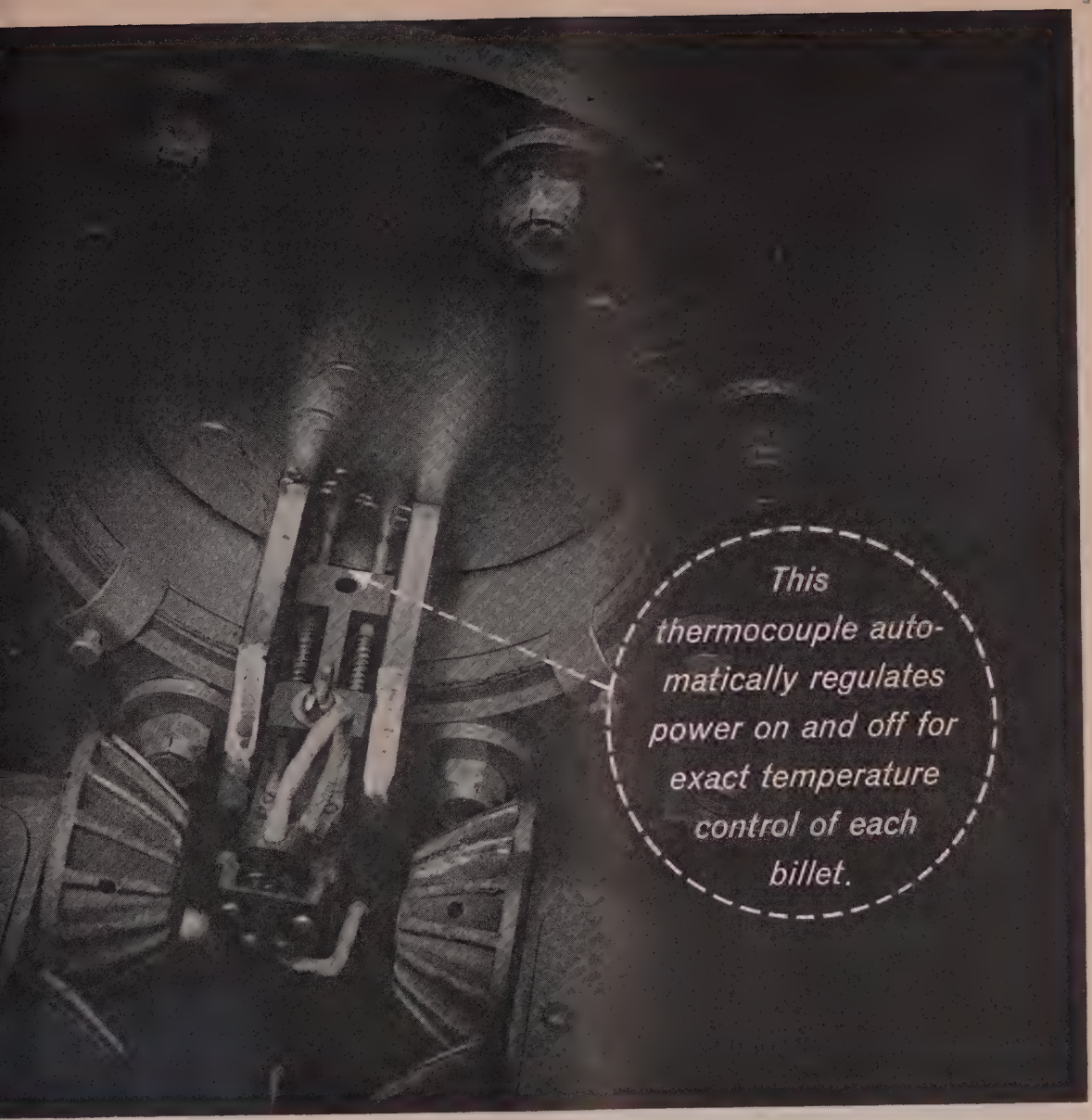
22 Pounds in the Lark

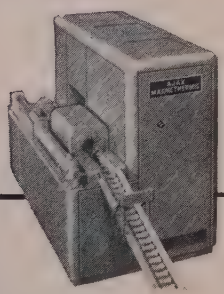
Studebaker-Packard reports tha Lark 6-cylinder models will carr close to 22 pounds of aluminum i various components, while 8-cylinde cars will have about 28¼ pound Studebaker Hawk will carry abou 30 pounds of the light metal becaus of side mouldings and instrumen panel parts used on this car.

The extent to which the averag aluminum poundage used per ca will be increased this year is sti being surveyed by aluminum pro ducers. Alcoa had figured that 196 U.S.-built autos averaged 62 pounds per car. However, one o server voiced the fear that a surve of 1962 models might reveal a lo as aluminum gives ground at var ous points to other materials.



■ ***Valiant, Lancer, Plymouth and Dod Darts have this one-piece aluminum cast carburetor made by Holley Carbu tor Co., Detroit. Simplicity in service said to be one of its strong points.***





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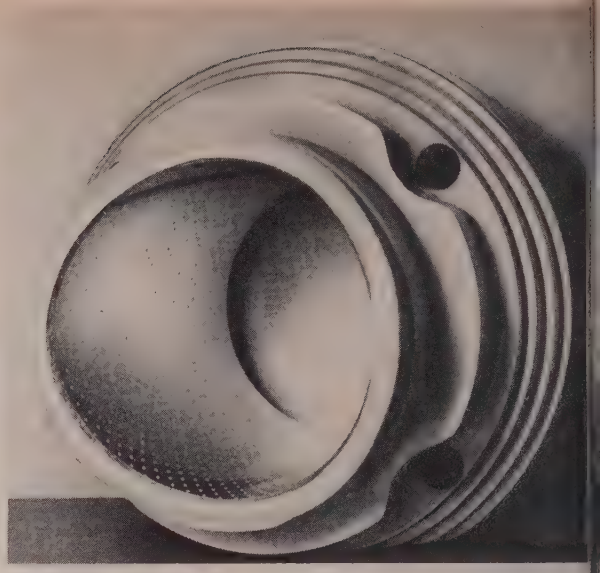
The Case for Chrome Plated Cylinder Bores in Aluminum Automobile Engines



The authors believe a properly applied chrome plate may replace iron liners in aluminum cylinders, as was done in the engine for the Porsche (Fig. 1 at right). This article is based on a paper given at a summer 1961 meeting of the SAE.

by L. W. Raymond and A. K. Wood
The Superior Plating Co., Fairfield, Conn.

ALLOYS of aluminum have long been recognized as excellent materials for the construction of internal combustion engines. Aluminum can do an admirable job of providing an engine of maximum horsepower per unit of weight.

Other important characteristics are: (1) Ease of die casting; (2) machinability; (3) corrosion resistance; (4) favorable mechanical properties such as modulus of elasticity, modulus of rigidity, tensile strength and yield strength.

However, other essential mechanical properties are conspicuous by their absence. These include: (1) Low coefficient of friction; (2) good score resistance; (3) anti-galling properties; (4) long life.

Prior to 1925, engines were using light metal cylinders with iron liners. One early example was in the Franklin automobile. In the horsepower range of its day, it was a successful application.

But this method of overcoming the deficiencies of aluminum with respect to wear and score resistance solved the problem only to a partial degree. As greater loads were impressed on engines it was found that the combination of iron and aluminum was not entirely satisfactory for the following reasons:

1. Loss of heat conductivity.

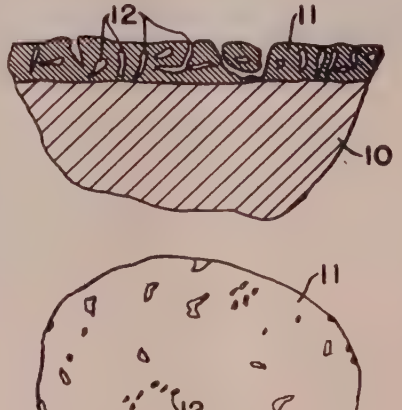
2. Different coefficients of expansion and consequent separation of liner and aluminum.

3. Loss of heat conductivity through the barrier between liner and aluminum.

In the meantime an alternate method of treating the cylinder bore had arisen. The chrome plating of iron had been accomplished since 1925, and it was destined that the attributes of chromium would be lent to the further development of the gasoline engine. The next significant step in the evolution of the aluminum cylinder bore involved the use of chrome plating.

In 1932, Hendrick Van der Horst produced a chrome plated iron liner which was patented in 1936. The patent states: "The rapid wear of cylinder bores is partly due to the high piston speeds now employed with aluminum pistons, but recent research indicates that the chief cause of wear is corrosion . . . by acid condensates from the burning fuel mixtures. . . ."

In 1943, Van der Horst secured another patent which states, in part: "A cylinder bore is provided with a coating of chromium, in the surface of which are formed numerous small grooves, pits or depressions. Under working conditions oil is retained in these and there is no tendency for chrome to pick up. . . ."



■ *Fig. 2. Cross sectional and face views of typical chrome deposit produced by the Raymond process. Interconnecting fissures, identified as "12", act as oil reservoirs.*

The surface described here was a tained by reversing the polarity of th plating current so that some deposite chrome was removed and the natur chrome crack pattern was opened ar enlarged.

Mechanical means of producing pi and depressions in chromium have al had considerable attention. One metho consists of pressing evenly spaced poc ets in the aluminum with a spoke knurling tool. The subsequent chrom plate generally follows the depresse outline. The bore is honed to finis size after plating.

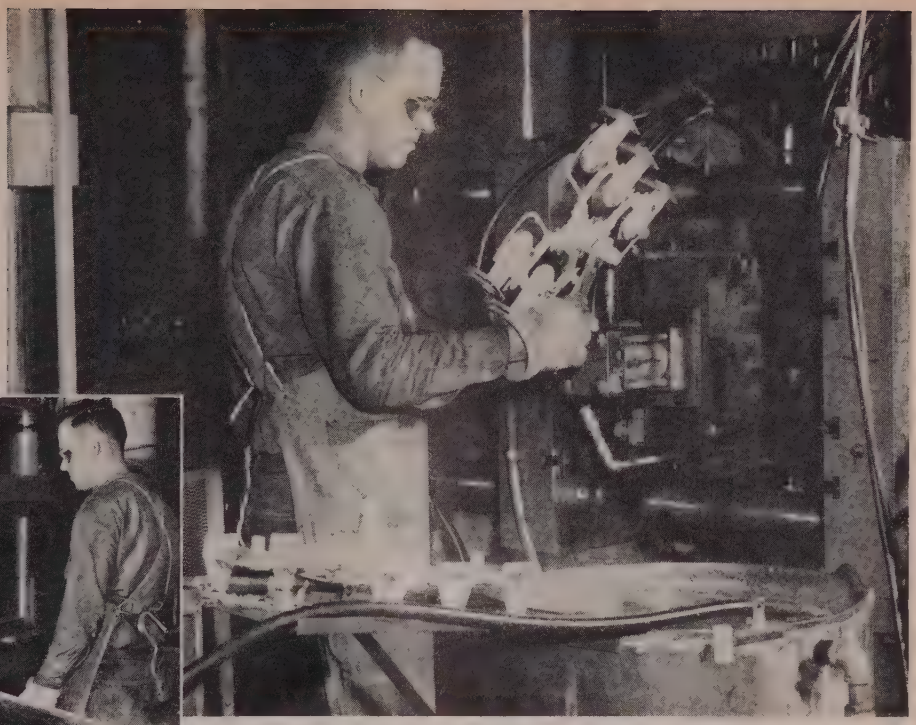
Mahle Co. of Germany observed th the depressions "bring about both better lubricating and the possibility picking up abrasive dust and impuriti . . . and rendering them ineffective."

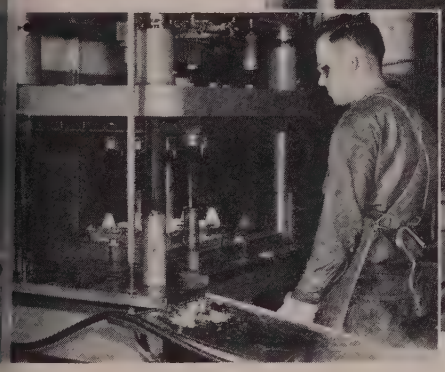
It is noteworthy that the Mahle C produces, among others, a high spee air-cooled aluminum engine for th Porsche. We have examined Porsch cylinders run over 100,000 miles. The were in excellent condition. None the upper ring groove wear, now see in our iron and iron-liner engines, w present. Mahle informs us that this the normal experience in this chrom ium plated cylinder (see Fig. 1).

Another interesting approach was l F. Passal in 1948. One of the characte istics of electro-deposited chromium a built-in stress, thought to be due to c cluded hydrogen. This stress accoun for the crack pattern in chrome plate

Passal discovered that heat treatme following plating broke the cracke islands of chromium into smaller island and many more fissures and cracks we made for improved lubrication rete tion. As a final step the chrome pla was reverse etched in the usual fashio and honed to size.

In more recent years, another a





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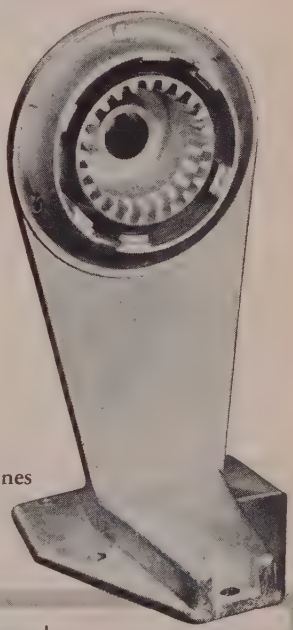

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proach has been taken by L. W. Raymond, to whom a patent was issued in 1958. This effort resulted in distinct advantages over prior arts in at least two areas.

First, it produced a fissured network of veins for the conduction of lubricating oil at and under the running surface of the chromium. The chrome, being in a spongy condition, provided a considerable lubricant reservoir. (See Fig. 2, which shows cross-sectional and face views of a typical chrome deposit as produced by the Raymond process.)

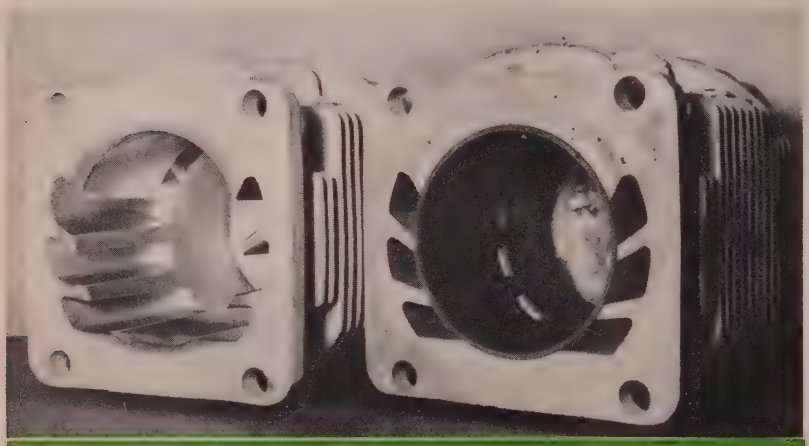
Second, this provided a porous condition with considerably less involvement than the prior art of chemical or electrochemical etch, and honing to finish and size. Furthermore, this patent was the first work designed specifically for use with high speed two-stroke aluminum engines.

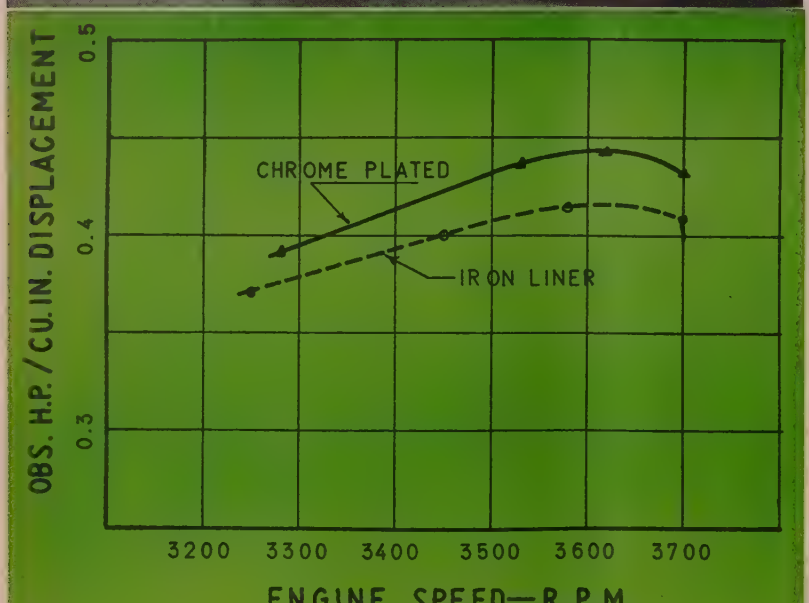
Chromium is used as a "lining" material for aluminum cylinders because it best satisfies the situation. Referring to Fig. 3, note the two cylinders, identical except for the bore treatment. The plated unit has greater intake area.

Fig. 4 is a power curve — horsepower versus speed — using the two cylinders shown in Fig. 3. The engine used for this demonstration was a Homelite Model 35 engine-generator, a typical lightweight, portable unit in common use. Except for the cylinder, the unit was otherwise identical for each test run.

This demonstration clearly points out that an engine will produce no more power than it is capable of accepting in gas-air mixture. Chromium plating has permitted this open-port type of construction for maximum intake area.

A second reason for the use of chromium in this application is its ability to transfer the spent heat of combustion quickly.





■ *Fig. 3 (top) shows two cylinders that are identical except that one at left is chrome plated, while other has iron liner. Note greater intake area in plated unit. Chart in Fig. 4 (below) compares power output of identical engines fitted with the two cylinders; shows clear advantage of open port design permitted by plating.*

A demonstration of the harmful e of poor heat conduction is show Fig. 5. In this picture we have two minum pistons, one run with an liner cylinder, the other with a ch plated cylinder. Note the dark, bu varnish deposits on the one pisto the extent that the rings have frozen in place. The other piston, the chrome plated cylinder is clean the rings are still free in their gro

It Simplifies Manufacture

A third reason for chromium pl would be manufacturing simplica In the case of the iron liner system aluminum cylinder is machined to f close tolerance, the iron liner is chined, including ID, OD and ports aluminum casting is heated to 6 the iron liner is dropped in and l up to the ports for a shrink fit, the of the iron is finish machined, and aluminum flange is finish mach square to the new bore.

In contrast with this series of o tions the chrome plated cylinder quires only three main steps: (1) the inder is machined in similar fashion it is chrome plated and the plated face is smoothed off mechanically; finish machining of the aluminum fl to square it to the new plated bore

A fourth reason for chrome pla would be the adaptability to com shapes. Fig. 6 shows a 2-cyl. alumi block designed to produce up to 10 Note the intricate porting and the p imity of the two bores. There is other way that this much power c be extracted from such a small pack This block is used in the Clinton T by Clinton Engines Corp.

Taper Bore by Plating

A fifth advantage of chromium ing has backed into the picture. A years ago one 5-hp engine would perform satisfactorily unless the cyli bore was tapered outwardly from cr to flange by approximately 0.002 in ameter. With a normal straight the cylinder would close in at the flan scuff the piston, causing power loss

However, the chrome plate was de posited in such a way to create thi quired taper, the cylinder having previously bored straight. The ma facturer was spared the expense o designing the engine, and the los production during such a delay.

What may be expected of chr plated cylinders can be best outline b a review of clinical and field experi

In 1949, A. W. Mall, president of Tool Co., conducted a series of test two-stroke engines. The plating fir van der Horst collaborated in these using the plating techniques ascribe to them earlier. Several improvement

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the chrome plated aluminum cylinder over the use of an iron cylinder were as follows: 32% greater horsepower, 40% reduction in weight, 35% reduction in sales price, and piston rings reduced from three to two.

The engine involved in this evaluation was their Model 10A, with 2-in. stroke, 2¼-in bore, 7.95-cu. in. displacement, and 4500 rpm speed. After 2000 hr of operation the maximum cylinder wear was 0.0006 in. diameter. Spark plug gasket did not exceed 300 F.

Mr. Mall also stated: "A change to one exhaust port allowed further simplification and economy. It has proved unnecessary to equalize stresses by exhausting simultaneously from each side because chrome on aluminum diffuses heat at a rate that avoids build-up of hot spot on the exhaust side to distort the cylinder. This rapid diffusion rate, coupled with better finning, made reduction of the parasitic drag of the cooling fan from 1 hp in the original model to ⅓ hp in the Model 10A."

Now that we have discussed the potentialities of chrome plated aluminum cylinders we shall discuss the cylinder requirements for successful chrome plating. Aluminum is not considered an easy material to electro-plate.

Which Alloy?

Perhaps the first consideration should be choice of alloy. The present chrome plating art is successful with 355, 356, 380, all of which are copper, silicon, and magnesium bearing alloys. Copper is a hardening agent; silicon improves the fluidity of molten aluminum and also increases the response of the alloy to artificial aging; magnesium increases the strength during heat treatment.

However, each of these elements, unless properly disposed, can be a nuisance in the chrome plating cycle. In the first place, we do not chrome plate on the aluminum, but rather on an intermediate layer of pure zinc, only millionths of an inch thick.

Before the zincate may be applied, all traces of materials other than aluminum must be removed. It is at this point that choice of alloy and proper heat treatment are important.

Silicon is relatively easy to remove. Magnesium is not too difficult either. However, it seems that any copper in excess of its solubility in aluminum (5.65%) creates plating problems. Also, experience indicates that improper solution and/or precipitation heat treatment will create plating problems.

It is our opinion that there is a point in copper precipitation between the grain boundaries, as altered by heat treatment and/or total copper content, that provides maximum plating success. Our successes have been with the following alloys and heat treatments: 380 - T51; 356 - T71; and 355 - T71.

Must Avoid Porosity

The second consideration should be porosity. Pits in the surface to be plated are objectionable for two main reasons:

1. These holes tend to trap cleaning and plating solutions which leach out from plating step to plating step and cause "blisters."

2. Chrome plate tends to build up nodular formations around ragged edges which tend to scratch the piston.

A third condition that develops in die casting comes about from the use of excessive die lubricant. When this happens semi-hard deposits are not dislodged until the parts are immersed in a hot caustic cleaner at the start of the preplating cycle. This material is then soft enough to run over the areas to be plated, but is not soft enough for the cleaner to remove it completely. Controlled-mist oiling of the casting die solves this problem.

A fourth condition concerns boring of the cylinder prior to plating. We have found that a finish not exceeding 50 microin., with our method of plating and finishing, is a satisfactory upper limit. Any finish rougher than this does not give predictable end results, particularly in the reaction of the piston to the cylinder wall.

Concerning the question of tolerance before plating, there is no single answer. This factor is largely one of economy of both the engine manufacturer's operations and the cost of chrome plating.

Last, but not least, aluminum is readily attacked by caustic materials and should be thoroughly cleaned of soluble oil machining compounds. We have seen cases where such compounds were not removed prior to plating. The compound formed metal soaps and this was not removed even by vapor degreasing. Of course, this material is not compatible with plating solutions.

We feel that if the above requirements are followed, predictable results are secured.

One major problem that faces the chrome plater is proper adherence of chromium plate to aluminum. This has led some engine manufacturers to cease using chrome plate because of high rate of failure. However, if the engine manufacturer and the chrome plating industry would make a firm resolution to solve their common problems, excellent results would follow.

The chrome plater can exercise good control of his plating solutions and obtain the finished chrome thickness and general surface finish, but one problem still remains: adherence testing in a nondestructive fashion.

Need Nondestructive Test

We know of no good nondestructive adherence test. Our present method consists of cross-hatching a plated area with a sharp cold chisel. The chisel marks show the chrome plate to follow the indentations and ridges produced by the chisel. This test, because of its severity, is positive. In production a small percentage sampling is suspected.

Finally, we feel that the chrome plating of aluminum cylinder bores is a preferred means of adapting aluminum to this use. In the last 15 years we have produced nearly 3 million cylinders, and have seen how successful such an application is.

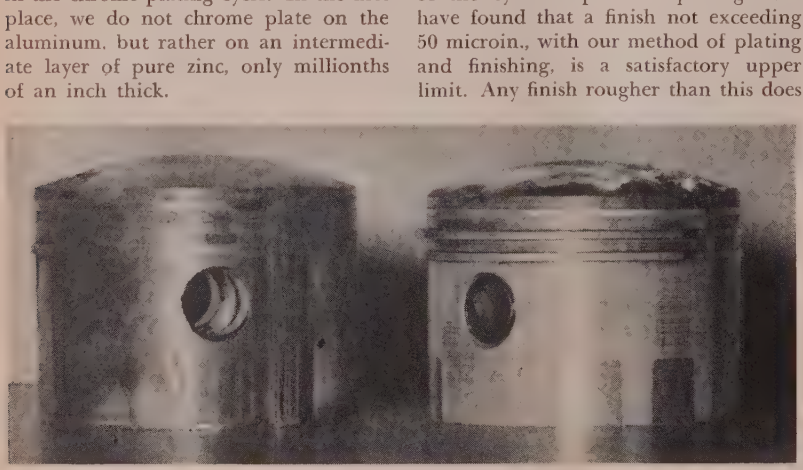
The chrome plating industry should continue and expand its study of the plating of aluminum engine components, particularly as related to:

1. Greater use of automation.

2. Correlation of aluminum alloy metallurgy and best plating results.

3. Character of chromium deposit for best results as cylinder bore treatment.

4. Development of nondestructive plating adherence test methods.



■ *Fig. 5 compares piston from iron liner cylinder (left) with one that was run in a chrome plated cylinder. Note dark, burned varnish and frozen rings of iron liner piston, compared with cleanliness and free rings of piston used in chrome plated cylinder.*

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Improved Refining Technique for Al-Si Alloys Boosts Properties for Auto Engine Castings

Ford scientists use copper-phosphorus brazing rod in modification process that refines primary silicon and the eutectic in aluminum-silicon casting alloys, and improves strength and wear resistance substantially. Little or no loss of refinement noted in remelting.

by Yeshwant P. Telang and M. G. Urdea, Ford Scientific Laboratory, Ford Motor Co.

THE development of an aluminum casting alloy suitable for a liner-free engine block would be an important contribution to the continuing effort to raise the horsepower-to-weight ratio of passenger automobiles. Progress has been slow, due mainly to the generally poor wear resistance of aluminum.

However, aluminum-silicon hypoeutectic or near-eutectic alloys have been used extensively in automotive pistons because of their superior wear properties. Theoretically, modified hypereutectic alloys should possess an ideal combination of good wear resistance, high strength, low density and low thermal expansion coefficient.

Until recently these alloys have been neglected, due mostly to their poor foundry characteristics. They solidify over a wide temperature range during which primary silicon forms and grows to large particles which float to the surface. This results in excessive variation of properties and difficulty in machining.

Also, the aluminum-silicon binary alloys are not age hardenable and the resulting soft matrix is sensitive to galling and must be hardened by adding copper and/or magnesium.

European studies indicate that preparation and modification of the melt under controlled conditions results in significant refinement of the primary silicon and the eutectic phases. Therefore, a program was initiated to explore commercially feasible modification techniques and to study the effects of several modifying agents on the microstructure, mechanical properties, wear and foundry characteristics of these alloys.

The first series of heats was designed to study the effect of grain refining additions—sodium, boron, titanium and phosphorus — on the microstructure, hardness, and tensile properties of an alloy with a nominal composition of 21% silicon and 2% copper:

The second series of heats was designed to study the effect of the variation in copper, manganese, iron and the modification treatment on the microstructure and the mechanical properties of the alloy. The nominal compositions examined are shown in Table 1.

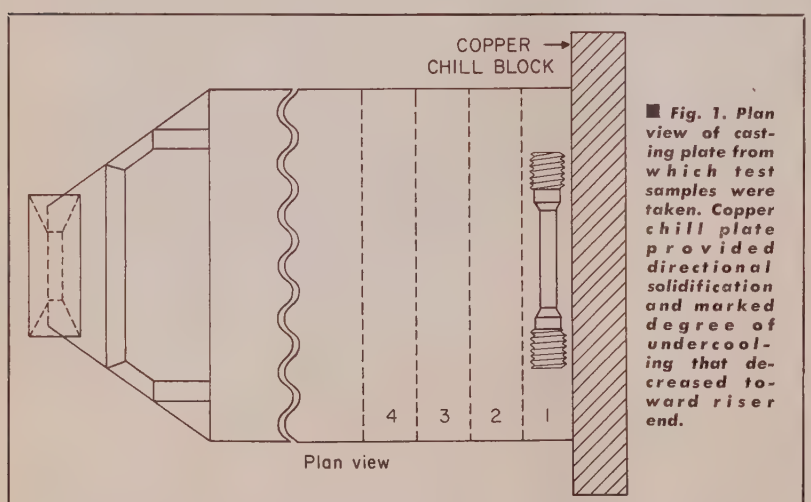
Also investigated were the effects of (1) remelting, (2) superheating, and (3) holding time and temperature on the size and the habit of the primary silicon and the secondary eutectic phases. Measurements of coefficient of expansion and resistance to impact deformation were made on the 150 series alloy.

Several 15-pound heats were prepare in a gas-fired furnace. In the earli heats, the charge consisting of 13 pounc commercial purity silicon master allo (24.26% silicon, 0.05% copper, 0.34 iron) 0.6 pound of aluminum-coppe alloy (50% copper) and 1.4 pounds high purity aluminum, was melted in Dixon graphite crucible.

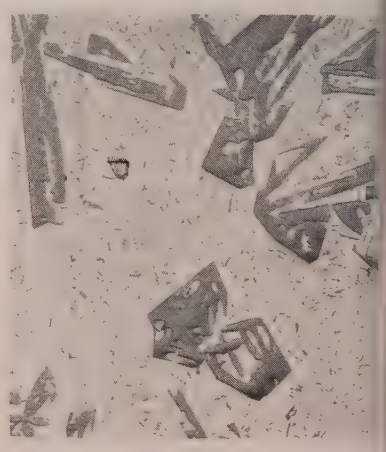
After melt down, the melt was supe heated to 1450°F; nitrogen was bubble through it for 5 minutes; the metal w skimmed; and one casting was poure at 1375°F. The remaining metal w superheated to 1450°F.; nitrogenate for 5 minutes; modified; and anoth casting was poured at 1375°F.

The modifying treatment in the pr liminary heats consisted of wrappir the material in aluminum foil ar plunging it below the metal surfac followed by vigorous stirring. In subs quent heats, the melt was chlorinate at 1450°F, (instead of nitrogenated) ar phosphorus was introduced by stirrin a known length of brazing rod throug the melt.

After modification, the melt was s perheated to 1600-1650°F and allowed cool to 1450°F when it was again chlo nated. This was followed by the ad tion of metallic magnesium at 1420°



■ *Fig. 1. Plan view of casting plate from which test samples were taken. Copper chill plate provided directional solidification and marked degree of undercooling that decreased toward riser end.*



■ *Fig. 2. Microstructure of sample fro unmodified alloy shows large primary si con crystals. Chill cast, X100, unetch*

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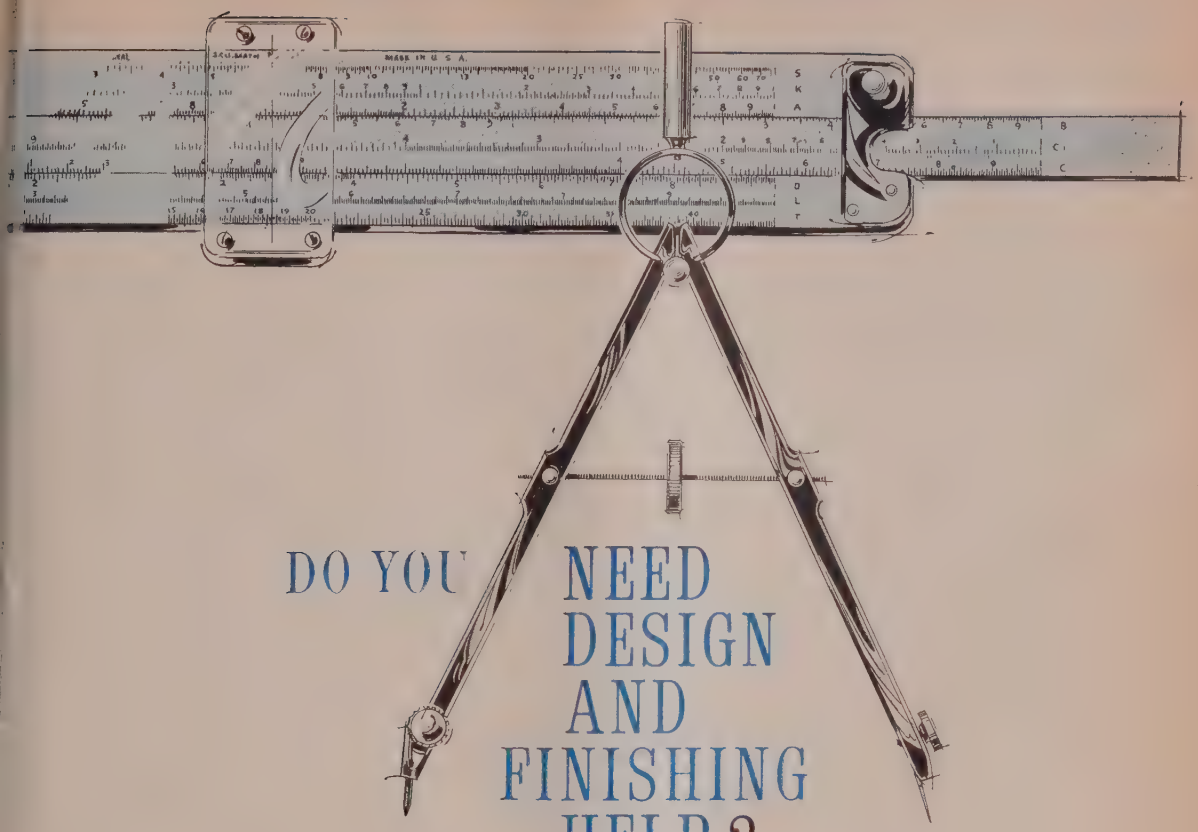

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Table I: Nominal Compositions of Heats

Alloy Code	Si	Cu	Mg	Mn	Fe
150	19-23	0.5 max	0.8-1.2	0.3-0.7	0.8 max
250	19-23	2.5-3.5	0.8-1.2	0.3-0.7	0.8 max
300	19-23	1.5-2.5	0.8-1.2	0.05 max	0.15 max

Modification Treatment

A—unmodified;
B—Na-modified
C—P-modified
D—P and Ti modified

and pouring of the casting at 1375°F.

The castings were poured in green sand and permanent molds. A ¾ x 5 x 8 inch casting plate was poured in green sand against a copper chill block, (Fig. 1) which provided directional solidification and marked undercooling that decreased toward the riser end.

Also, a 1-inch dia. by 6-inch long casting was poured in a permanent mold whose gating was progressively modified until radiographic analysis indicated a shrinkage-free casting.

Test specimens were ¾-inch square by 5-inch long sections sawed off the casting plate; tensile specimens 3 inches long with 0.250-inch diameter by 1⅝-inch reduced gage section were machined from each piece.

Impact deformation test specimens, 10 mm. dia. by 20 mm. long, were machined from the 1-inch diameter casting. Several specimens 0.150 inch round by 1.961 inches long were prepared for determination of the coefficient of expansion.

Room temperature tensile tests were conducted on as-cast and heat treated specimens. Heat treatment (T7) consisted of solution treating at 955°F for 8 hours, quenching in hot water, and ageing at 400°F for 4 hours.

Brinell hardness measurements were made on sections of the plate castings to determine the effect of undercooling on hardness.

The impact deformation test consisted of dropping a load of 7 pounds and 4 ounces a distance of 2 inches on the end of a specimen and measuring the reduction in length after each blow for 25 consecutive blows.

Test Results

The typical, unmodified microstructure of a chill cast specimen 1/32 inch from the chill is shown in Fig. 2. The primary silicon crystals are massive, non-uniform, and angular. The silicon occurs in the matrix as thin long needles.

Modification with 0.05% metallic sodium changes the primary silicon particles from angular to dendritic and the size from massive to fine. A substantial refinement of the eutectic is also evident in Fig. 3. This modification materially lowered the hardness range from 86-65 BHN to 74-69, reflecting the reduced sensitivity of the modified melt to undercooling. Tensile strengths were higher for the modified alloys over the entire range in the cooling rate.

The addition of 0.03% phosphorus, as phosphor-copper, almost doubles the strength of an unmodified alloy, and gives approximately a 50% increase over

■ *Fig. 3. Specimen of Heat No. 1B, modified with 0.05 Na. Note primary silicon crystals. Chill cast, X100.*

that of a sodium modified alloy. The primary particles (Fig. 4) are numerous, uniformly fine, angular, and evenly distributed.

Also, the matrix appears devoid of the alpha solid solution grains prevalent in the sodium treated samples. Although the silicon constituent in the eutectic is coarser, it does not show any cell formation tendency which implies a sharp reduction in growth rate.

The mechanism of refinement in the phosphorus treated alloys is apparently different from that in the sodium-treated alloys. Phosphorus appears to sustain a high nucleation rate during the entire solidification range, thereby restricting growth.

The refining effectiveness of 0.02% phosphorus and 0.05% sodium added together is lower than that of 0.03% phosphorus and higher than that of 0.05% sodium when each is added separately. The primary silicon particles are dendritic, and the dendrites are shorter and stubbier. But the pronounced directionality typical of t sodium treated melts is absent.

The microstructure of a specim treated with 0.03% boron is shown Fig. 5. The primary silicon partic are non-uniform in size, fewer, larg and unevenly distributed as compar to those in the phosphorus trea specimen. Also, the mechanical prop ties showed little improvement o those of the phosphorus treated m

The microstructure resulting fr the addition of 0.20% titanium similar to the boron treated specim In fact the primary particles w slightly coarser, with little improveme in the mechanical properties.

The use of 0.20% titanium a 0.02% boron improved tensile strengt but the microstructure showed so what coarser primary silicon partic The slightly finer eutectic proba contributed to the higher strength le The mechanism of refinement w titanium and boron appears to growth-dependent due to the abse of continued nucleation of prim silicon.

The microstructure of the m treated with 0.02% phosphorus a 0.02% boron is shown in Fig. 6. N that the structure is similar to c treated with 0.03% phosphorus. T strength levels are also comparab With the addition of a mixture 0.02% phosphorus, 0.02% boron, a 0.20% titanium the primary parti count is increased and the eutectic s con constituent appears slightly coars but tensile properties are almost

The addition of 0.03% phospho in the form of a commercially availa copper-phosphorus alloy brazing rod a chlorinated melt has produced cellent refinement. As shown in Fig the primary and the eutectic silic particles are approximately one fou

(*Continued on page* 48)

■ *Fig. 4. Heat No. 5B, modified with 0.3 P as copper phosphor pellets. Note refinement of primary crystals. X100.*

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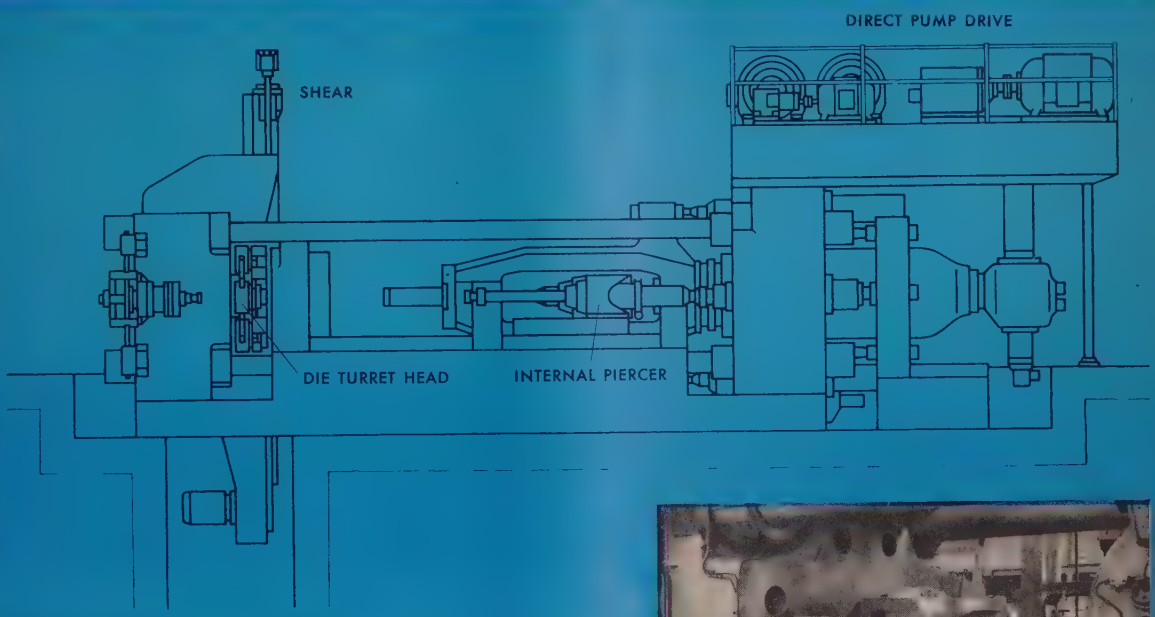

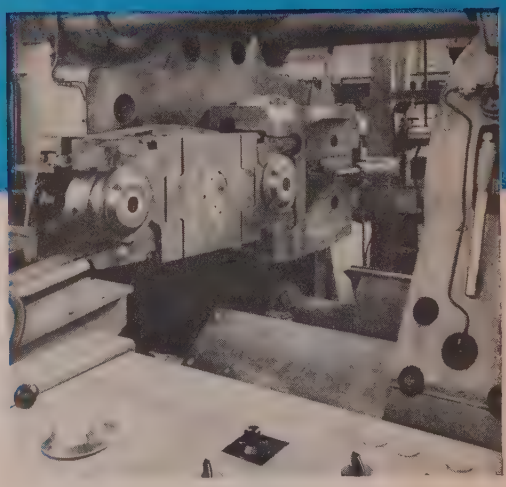

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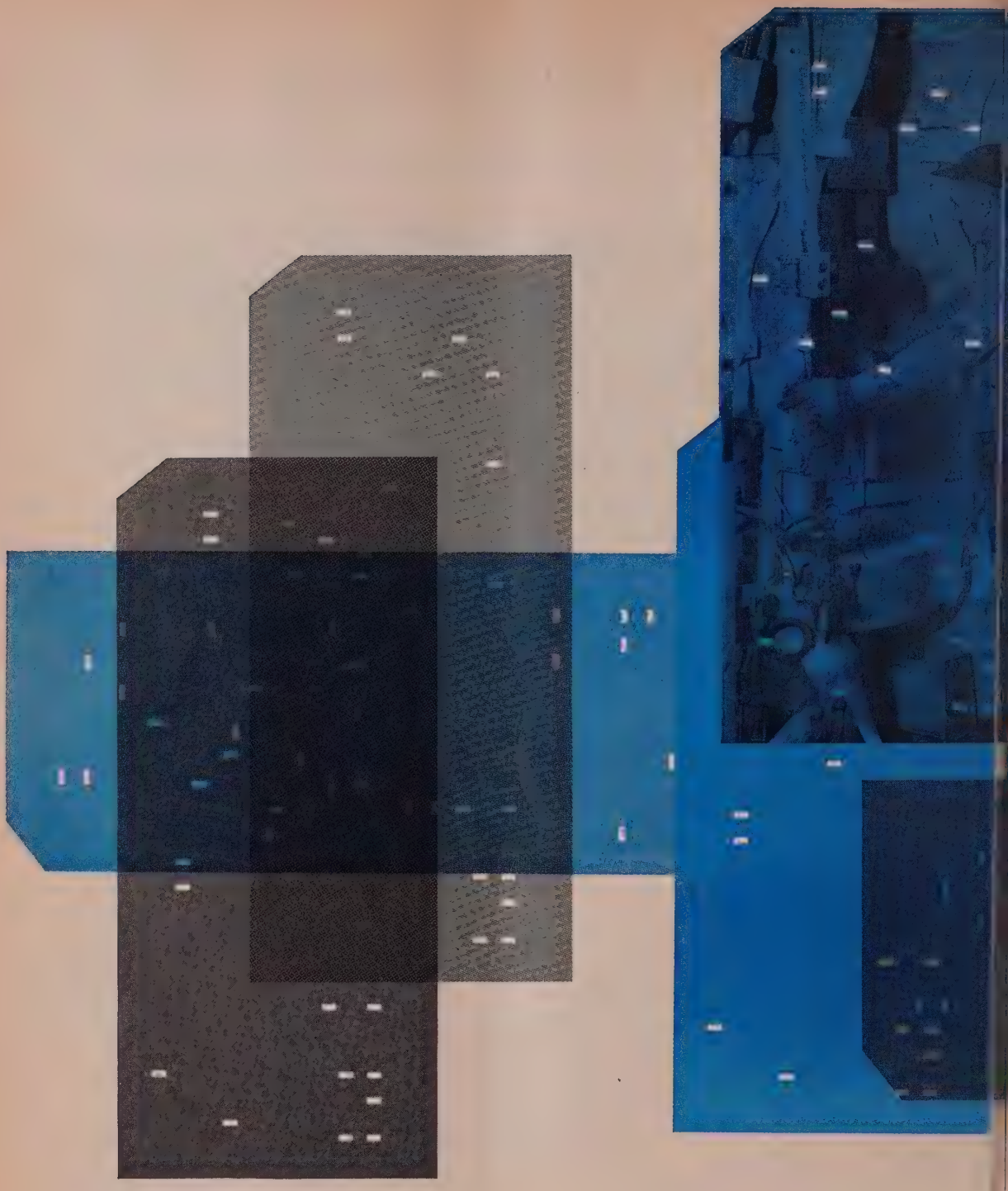

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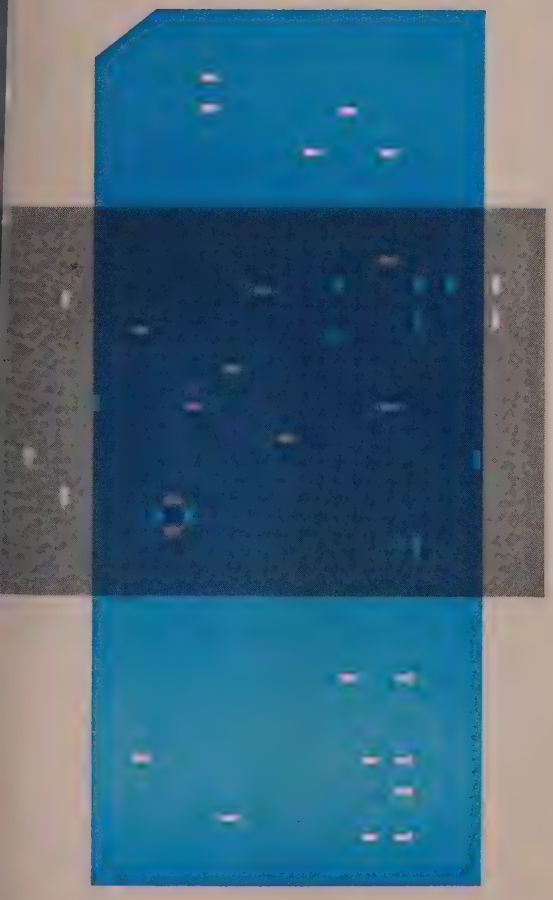

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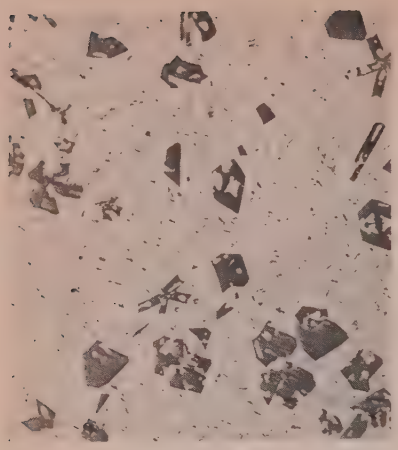

■ *Fig. 5. Heat No. 3B, modified with 0.03 B. Primary crystals are coarser than in Fig. 4. Chill cast, X100.*

as big as in the best earlier samples.

The refinement is attributed to the following factors: Chlorination prior to the phosphorus addition; uniform distribution and higher phosphorus recovery; superheating after phosphorus treatment; post chlorination; and adding magnesium prior to pouring.

Chlorination might have fluxed off the adverse nuclei and increased the undercooling tendency of the melt, thereby elevating the phosphorus recovery from 20 to 90%. The use of 7.5% phosphorus alloy rod as compared to 15% coarse phosphorus pellets doubled the mass of the additive, permitting higher recovery. The rod also distributed phosphorus evenly into the melt. The introduction of clean metallic magnesium into the melt prior to pouring probably provided a sustained nucleation rate over the entire solidification range.

Refinement of the two silicon constituents using the new techniques raised the strength to 43,000 psi, substantially higher than reported in the literature for alloys of this system. It is suspected that the fine microstructure would also considerably improve wear resistance and machinability.

Analysis of microstructures away from the chill indicates that the refinement is predominant even at low levels of undercooling which implies that the mechanical and the wear properties in the sand mold castings would tend to increase and possibly be less dependent on the solidification rate.

The variation in phosphorus addition over a range of 0.005 to 0.30% and its effect on the microstructure have been studied. The microstructures indicate that the refinement is slight at 0.005%, good at 0.01 to 0.02% and maximum at 0.03%. Exceeding the 0.03% level does not seem to improve microstructure.

Survives Remelting

Since remelting and superheating of back-stock is standard commercial foundry practice, their effect on the microstructure is important. Results indicate that the microstructure after three consecutive remelting and superheating operations suffered little loss in refinement.

Furthermore, holding the melt for one to two hours at temperature did did not inflict any loss in refinement. But exceeding the superheating temperature limit of 1680°F caused coarsening of the structure. Resistance to

■ *Fig. 6. Heat No. 8B, modified with 0.02 and 0.02 B. Structure similar to Fig. X100.*

coarsening after three remelt operation is very desirable and permits considerable flexibility to the producers of commercial castings.

The tensile and the hardness properties of the alloys are listed in Table The C-250 heats, which had higher copper content than the C-150 heats, registered higher tensile properties. This may be attributed to increased hardening of the matrix as a result of higher copper content. Also, higher phosphorus recovery was observed in these heats.

The C-300 alloys, which were close to C-150 alloys in copper content but did not contain manganese and had only 0.15% iron, consistently registered maximum phosphorus recovery with intense refinements of the two phases, and the highest tensile and the yield strengths of 46,000 and 41,000 psi respe

Table 2: Mechanical Properties of Aluminum-Silicon Alloy Heats Tested

Heat No. or Series	Ultimate Strength (psi)		Yield Strength* (psi)		Elongation in 2 inch	B.H.N.	
	1	2	1	2	(%)	Cast	T7
1A unmodified	6,600	18,600	—	15,100	0	74	109
4A "	6,900	15,500	6,800	13,800	0		
5A "	11,400	17,700	10,400	15,100	0		
1B 0.05 Na	16,300	21,300	13,900	18,300	0	70	86
2B 0.20 Na	13,200	22,600	12,500	19,700	0	70	77
3B 0.03 B	9,800	16,800	9,000	14,100	0	69	80
4B 0.20 Ti	9,000	17,900	8,300	15,500	0	86	100
5B 0.03 P	23,200	29,600	22,800	25,900	0	86	114
6B 0.02 P + 0.05 Na	20,400	24,000	18,600	22,200	0		
7B 0.02 P + 0.20 Na	13,300	23,100	10,900	20,600	0		
8B 0.02 P + 0.02 B	21,100	31,100	19,600	28,500	0		
9B 020 Ti + 0.02 B	12,900	20,600	12,200	16,500	0		
10B 0.02 P + 0.20Ti + 0.02 B	22,200	31,500	22,000	30,600	0		
150C 0.03 P + Cl_2	28,000	39,200	26,000	38,000	0.5—1.5	69-86	104-136
250C 0.03 P + Cl_2	35,000	43,000	29,000	40,000	0.5—2.0	76-92	126-156
250D 0.02 P + 0.20 Ti + Cl_2	34,000	43,800	28,400	39,600	0.5—2.0	76-92	126-150
300C 0.03 P + Cl_2	36,000	46,000	30,000	41,000	0.5—1%	69-83	116-142

Note—1—Specimen 4 inches from the chill
2—Specimen adjacent to the chill
*—When elongation is zero proportional limit reported as Y.S.
All specimens subjected to T7 heat treatment

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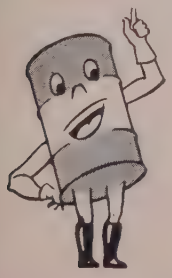

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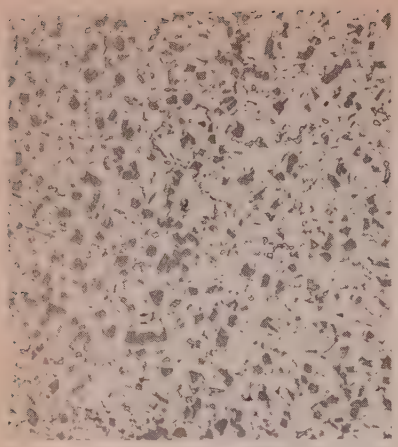


■ *Fig. 7. Heat No. 411, modified with 0.03 P as Cu-P alloy rod, using new melt cycle. Note refinement of primary and eutectic phases. Chill cast, X100.*

tively. Hardness, however, was somewhat lower than in the C-250 series, probably due to lower copper content.

The superior tensile properties are probably the result of the highest phosphorus recovery, which may be associated with the low iron content. This suggests the need for more experimental data to verify the effect of iron.

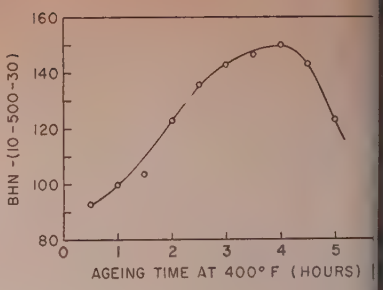
Titanium and phosphorus additions did not result in any improvement in the properties over the phosphorus treated heats. The solid solution strengthening effect of titanium, if any, was not evident.

The ageing time (after the solution treatment for 8 hours at 955°F) versus hardness curve for the C-250 series alloys is shown in Fig. 8. The maximum hardness of 150 BHN was realized after 4 hours; further ageing resulted in a rapid drop in the hardness.

The expansion coefficients for the C-250 and the C-300 alloys over 0-100°C range were found to be 17.6 and 13.0 in/in respectively as compared to 10.1 for gray iron. The former values are significantly lower than that of the D132 alloy; the reduction in the case of the C-250 alloys amounted to 18 to 20%, slightly higher than in case of the C-300 alloys, probably due to the higher copper content.

Increasing the copper and the nickel contents to 4.50 and 1.0% respectively did not decrease the coefficient appreciably, but increasing the nickel content to 2.65% level did.

The impact test results revealed that resistance to deformation increases with the yield strength, but the results indicate that the 2014-T6 wrought alloy with 64,000 psi ultimate and 42,000 psi yield and 10-12% elongation showed consistently higher deformation than the C-150 alloy which registered 39,200 psi ultimate and 38,100 psi yield



■ *Fig. 8. Effect of aging time on hardne*

strengths with only 0.5 to 1.5% elong tion.

Of the aluminum alloys tested t C-150 series showed maximum resistan to deformation. It is presumed that t resistance to deformation of C-250 a C-300 series, which have higher ul mate and yield strengths but the sa elongation, would be superior to th of the C-150 alloy.

Conclusions

1. Phosphorus refines the primary a the eutectic phases in hypereutec aluminum-silicon alloys effectively a maximum refinement occurs at 0.03 Combining phosphorus with other e ments, particularly sodium or boron, duces the refining tendency drastical

2. An effective and potentially co mercially operable cycle of melt prep ration and modification with a copp phosphorus alloy brazing rod has be developed, and the treatment has p duced a consistently high degree of finement.

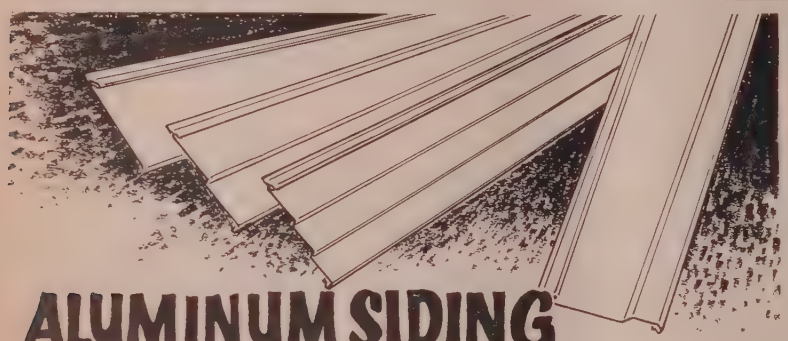
3. Remelting and superheating of t back stock successively three times a holding the melt at temperature f one to two hours showed very little no loss of refinement.

4. The 46,000 and 41,000 psi ultima and the yield strengths of the C-3 series chill cast alloys are substantia higher than those of the commerc automotive and heavy duty piston loys, and the experimental aluminu silicon alloys reported in the literatu

5. The coefficients of thermal pansion of the C-300 and C-250 ser are 15 to 20% lower than those of t current piston alloys. Nickel additi does not appreciably decrease the efficient until it reaches the 2.65 level.

6. Resistance to deformation und impact of the C-150 series alloy, desp its lower yield strengths, is almost twi as high as that of the strongest 2014- wrought alloy which is attributed to low percent elongation.

The high tensile and hardness prop ties, with low thermal expansion coe cient and good wear properties of t aluminum silicon alloys, suggest th ultimate potential application for liner-free engine block casting.



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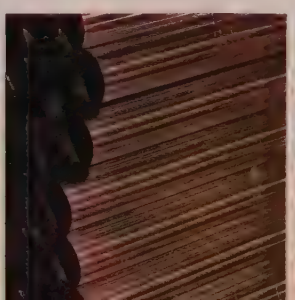

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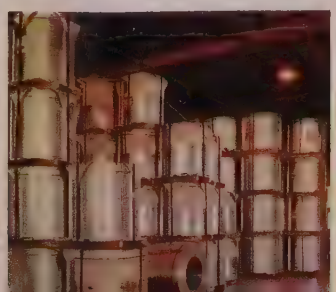

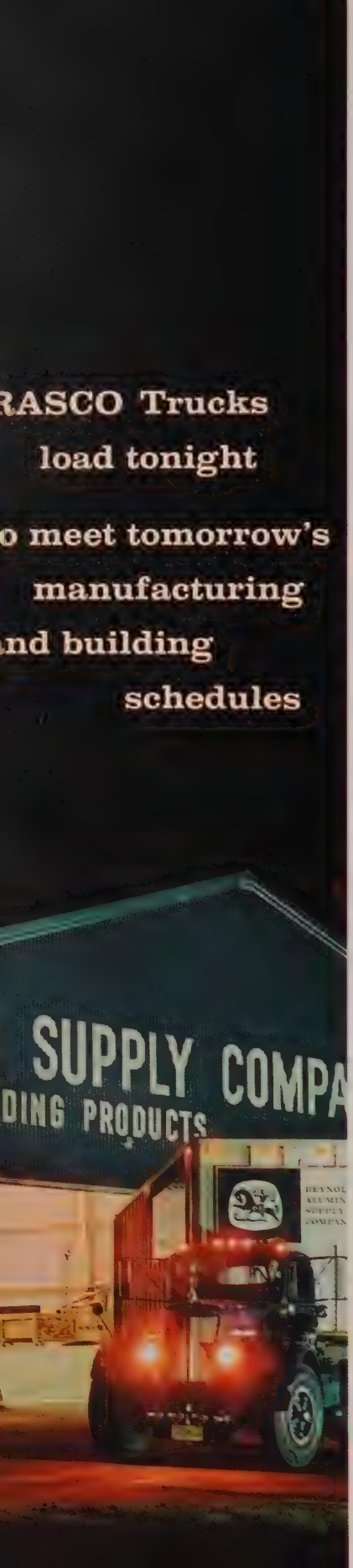

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erforated Plywood boards had to eplaced often because the holes hem became larger through use. o, they were hard to handle and cult to store. All these shortcom- added up to one big disadvan- e: Plywood harness boards be- ie costly items.

ose Aluminum Because . . .

After thinking over the various advantages of plywood, Raytheon ineers reasoned that perforated tal boards would last longer be- ise holes would not enlarge. Alu- num was selected because its light ight would make boards easier to ndle.

Now, Raytheon uses 2024-T4 aluminum sheet, .120-inch thick and supplied with $\frac{1}{8}$-inch perforations by the Ferguson Perforating Co., 13 Ernst St., Providence, R. I. Each board Raytheon cuts from sheet weighs about 3 pounds; is expected to be usable for three years.

How They Are Made

Sheet is cut to size for processing of harnesses in production, then wood strapping is placed around the edges like a picture frame to permit clearance for steel pin placement in the board. Next, a blueprint showing the particular cable harness configuration involved is taped smoothly down over the metal board.

A light is placed behind the board to sharply illuminate and silhouette the lines of the cable on the blueprint. Steel pins, with special collars to regulate depth of pin insertion, are then placed along the cable's configuration. Finally, the cable itself is layed in.

According to Raytheon this jigging procedure can be performed twice as fast with aluminum boards as with plywood.

The metal boards, after pins are removed, can be stacked flat, eliminating the need for a special storage room and the cable suspension facilities required for the wooden boards. Wooden boards couldn't be stacked flat because nails would bend under the load, and couldn't be removed because hole size would be altered.

Saving: $2000 a Year

Aluminum harness boards solved several problems for Raytheon—short board life, slow jigging, storage, handling—and at the same time reduced costs. The company estimates the aluminum boards will save $2000 a year.

l Steps in making a harness board: Left, Jig maker tacks trapping to perforated aluminum board. His other implements re steel pins, masking tape, a blueprint. Center, Laying in ire on the board. Right, with light source behind board, configuration of cable harness shows through, enables jig maker to place pins in right places. Pins have collars to prevent them from going completely through the board. The aluminum boards are easily stored.

Olin survey assesses

THE OUTLOOK FOR ALUMINUM IN WINDOW

Olin survey of $750 million business reveals slowing of "phenomenal" growth. Manufacturers report industry's problems; suggest solutions.

FIFTEEN years ago, aluminum prime windows had achieved no more than a 5% penetration of the residential window market, and only 11% penetration in non-residential applications. For sliding doors the situation wasn't even as good, and curtain walls were little more than an architect's dream.

Today, these are the products of the industry that is the largest single user of aluminum extrusions. Each aluminum product has relegated its steel counterpart to a poor second place. And aluminum is challenging wood in the residential prime window market, the only place where wood matters.

The industry is expected to consume some 125,000 tons of aluminum this year, not including 70,000 tons of extrusions for making combination storm windows and doors, and 10,000 tons of aluminum sheet for making window screens, curtain wall panels and other components.

Sales of aluminum prime windows, sliding doors and curtain walls today are at a current annual rate of $750 million*, more than 1000% greater than in 1950.

Looks Prosperous, But . . .

Despite these outward signs of vitality and prosperity, however, the industry's own members—and many outsiders—know it to be an economic jungle in which a fair profit by ethical means is a rarity; an industry in which existing standards are flouted and where poor product quality is all too common.

This condition has existed for a long time, and the Metals Division of Olin Mathieson Chemical Corp. has surveyed the prime window, sliding door and curtain wall manufacturers to spell out the problems.

"Together these three products represent a fairly homogeneous industry," Olin said. "Evidence of this is the fact that almost half of the manufacturers surveyed make at least two of them . . . Despite a very favorable overall industry picture, many individual manufacturers appear to be facing a gloomy financial outlook. Hence, emphasis during the survey was placed on detecting the reasons for these conditions."

How They Were Surveyed

The survey is one of the most comprehensive ever made of the field. Olin, after a painstaking preliminary survey, believes that 296 manufacturers produce the greatest bulk of the windows, doors and curtain walls, and that between 50 and 75 smaller firms produce mostly for local markets. Of the 296 contacted, 86 firms completed a detailed three-page questionnaire, mostly in interviews with Olin representatives. Questionnaires were mailed to several West Coast manufacturers.

Of the 86 responding firms, 20 buy their extrusions from a primary producer exclusively. On the other hand, 14 deal only with independent extruders, while 10 are able to depend on their own presses. Thirty-three patronize both producers and independent extruders, while the remaining nine respondents have varying combinations of sources. The entire group operates 144 plants.

As anyone in the know would expect, opinions on the current state of the aluminum window and door industry were mostly unfavoral
Of the total responding to the qu
tionnaire, 47 indicated their view
a depressed industry with such
complimentary terms as "chaot
"cut-throat," "deteriorating," "
moil," etc. Only 11 took an unc
cal attitude; 13 described the b
ness as "highly competitive." "I
quality" and "low profit margi
were the terms used by 10 ot
companies.

Generally, opinions elicited fr
this question reflected on the sta
ards set up by the Aluminum W
dow Manufacturers Association,
practice of underselling, poor qu
ty of products and general confus
in the industry.

These respondents didn't lack
suggestions as to what is needed
improve the industry. Product
provement was mentioned 17 tim
better cost controls, and an effect
industry code governing minim
specifications, each had 10 mentic

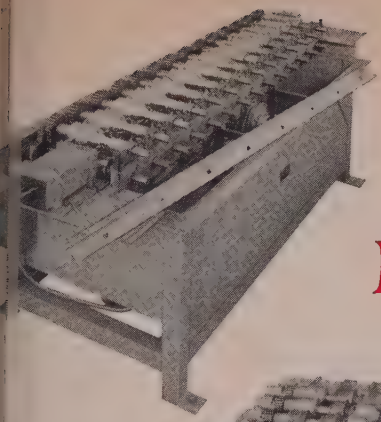
'Unqualified' Manufacturers

Nine opinions had to do with
glutted window and door manu
turing field. The way they see
some manufacturers are "unqu
fied" — presumably by reason of th
lack of suitable capital investme
These "cheapies" should be "eli
nated," they contend. There w
six calls for upgraded design of w
dows and doors, while five called
a higher standard of ethics in
business.

Surprisingly, only three brou
up the preponderance of wind
and door sizes and designs, a co
plaint that has been heard in
industry for many years.

The final question; "What c

*The figures include the value of the glass and other window, door and curtain wall components, and the cost of installing curtain walls.



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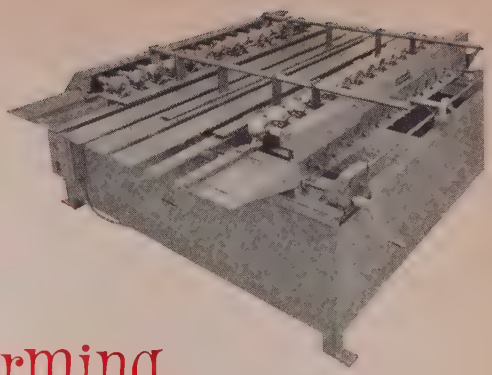

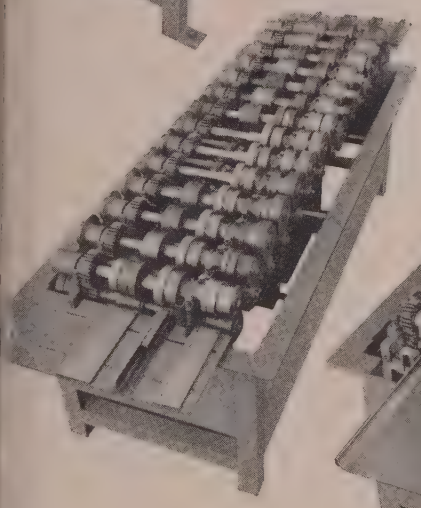

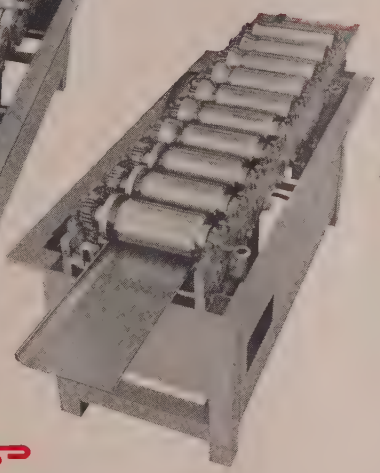

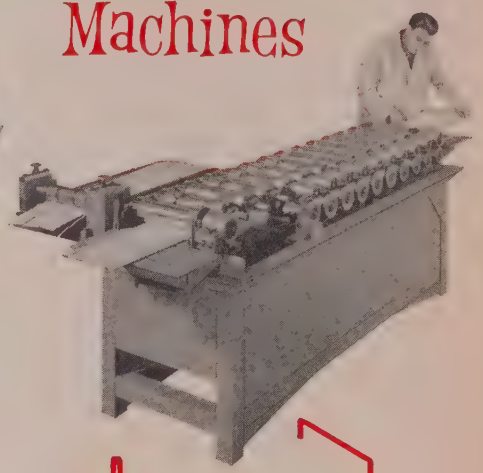

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ME SAVING, MONEY MAKING EQUIPMENT

the primary producers do to aid the industry?" stirred up familiar complaints. Nineteen opinions had to do with the producers' credit practices. Typical quotations revolved around the producers' practice of "subsidizing marginal" (manufacturers). Other ideas voiced were: "less ridiculous credit," "insist on financial responsibility of customers," and "maximum 30-day credit."

Naturally, there were quite a few (16) references to finished products competition by raw material suppliers. The 86 respondents are mainly window manufacturers, but some of them are extruders, too. Presumably some of these particular complaints came from the non-extruding window assemblers who run into competition from assemblers who extrude. The survey isn't plain as to whether or not other plaintiffs were the extruders griping about the extrusion sales of the primary producers.

Answers to another question indicated that the window and door people are aware of the value of research, but mainly in the areas of competitors' products, prices, sales methods and policies. Less effort seems to be expended in market research involving builder and home owner reaction to the company's own products, suitability of product lines, etc.

How Many Will Diversify?

That many manufacturers are aware of the value of diversification was shown by the fact that 34 of the 86 respondents are doing "considerable" research in this direction, while 31 more said they are doing "some." Ten indicated they had no interest in new, diversified product possibilities, and 11 did not answer this part of the question.

Obviously, diversification is viewed as the answer to the aluminum window and door industry's unsatisfactory profit level. Fifty-nine of the 86 firms answered "no" to the question: "Is the level of profit on window and door operations satisfactory?" Twenty-one said they were satisfied, and six did not answer.

However, 46 indicated in another part of the question that they anticipated "a profitable level" for 1961; while 26 said they did not expect a profitable level. One manufacturer was doubtful, and 13 didn't give an opinion.

In an earlier question, "Is the entire window and door line profitable?" 55 firms answered affirmatively, while 25 said "no." Six did not answer.

Is Growth Slowing?

Olin reports that the aluminum window and door industry growth is starting to slow down after years of "phenomenal" growth. However, the question, "Are aluminum windows continuing to penetrate the residential window market?" brought 53 affirmative answers and only 12 felt they were not. Twenty-one didn't answer this part of the question.

Fifty-eight respondents thought aluminum windows are continuing to penetrate the non-residential market; 3 did not, 25 didn't answer. To the second part of this question—"If not, what are the reasons?"—answers were few and inconclusive.

It would seem that most of the 86 firms are well qualified to gauge growth because only 8 of them have a distribution area under 500 miles' radius. Thirty-eight of them have national distribution; an additional 13 have national *and* foreign distribution, and 27 are large regional distributors.

This distribution is achieved in a surprisingly wide variety of methods: 47 firms stock wholesale and retail distributors; 21 stock jobbers and only sell wholesale. Thirty-seven service the orders of non-stock dealers; 60 sell direct to build and contractors; 26 sell direct prefab manufacturers. Twenty- sell direct locally, but depend distributors elsewhere, while 24 s to their own warehouses. Thirty have manufacturers agents or re sentatives. There are still other, common distribution methods.

Olin makes certain observation a result of the survey findi Quality and performance stand as established by the industry's sociations should be upgraded adhered to; manufacturers sho keep in close touch with archite engineers, contractors, home bu ers, and home owners to assure the industry's products meet requ ments, according to Olin.

They should also cooperate cl ly with government agencies enforce established specs, and st better design and more efficient duction techniques that will uti aluminum to its best advantage

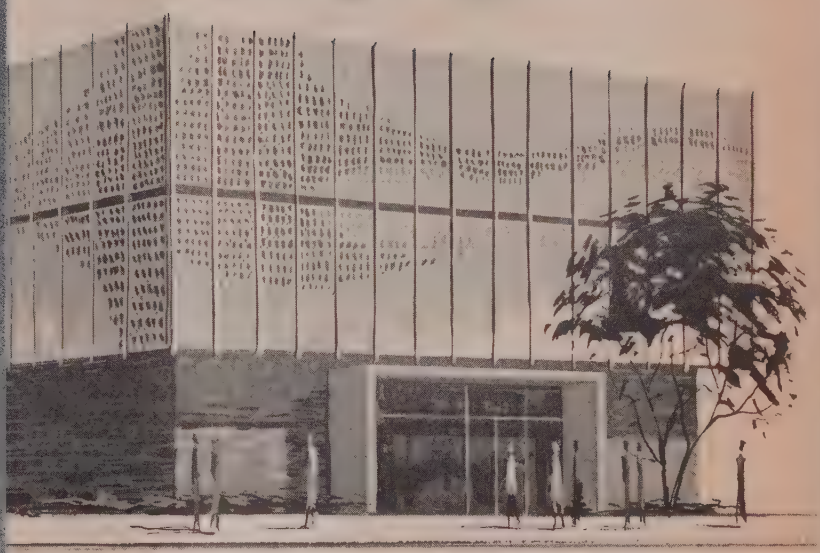
"The aluminum producers, h the integrated and non-integra should give full support to indu trade associations and participat association activities," Olin ur

Olin Advises Producers . . .

Olin also recommended that producers: Extend marketing search studies pertinent to ma facturers' distribution, costs quality control; extend credit "on realistic terms and condit that meet the operational requ ments of the industry without tributing to unsound business tices;" help individual fabrica of windows, sliding doors and tain walls with their engineering sign and marketing efforts; co end product fabrication to i that will not directly conflict those offered by their customers; design a uniform system for d nating alloys and finishes.

Growth of Aluminum Extrusions in Windows, Sliding Doors and Curtain Walls

	Residential Prime Windows			Nonresidential Prime Windows			Sliding Doors			Curtain Walls (Frames Only)		
Year	Alum.	Steel	Wood	Alum.	Steel	Wood	Alum.	Steel	Wood	Alum.	Steel	Oth
1947	5%	40%	55%	11%	78%	11%	10%	40%	50%		Negligible	
1954	16	24	60	35	59	6	60	30	10	80%	12%	8
1957	37	10	53	57	37	6	90	5	5	88	8	4
1960	45	6	49	66	28	6	92	4	4	90	8	2



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JOINING MAGNESIUM, PART 2:

RESISTANCE WELDING • BRAZING

Last month, Part 1 of this series detailed arc welding of magnesium. Part 3 will cover fastening of magnesium.

**From Information In "Joining Magnesium" (Booklet 141-216)
By the Dow Metal Products Co., Div'n of The Dow Chemical Co.,
Midland, Michigan**

MAGNESIUM can be readily joined by electric resistance spot, seam and flash welding. We will concentrate on spot welding because it is the most widely used technique.

Spot welding is used mostly for low stressed applications or for high stressed parts where there won't be excessive vibration. Spot welds have excellent static strength, but fatigue strengths are lower than for either riveted or adhesive bonded joints. Proper spot spacing is vital (see Table 1), as is accessibility to weld area for welding electrode tips.

The following magnesium alloys have excellent spot weldability: AZ31B, C, AZ61A, AZ80A, HK31A, HM21A, HM-31A, ZK21A, ZK60A. Avoid welding dissimilar alloys, especially if they have markedly different properties.

To spot weld magnesium you must have high welding current, positive control of pressure, and accurate control of welding time. Electronic equipment only should be used.

There are several types of a-c and d-c spot welding machines. An a-c three-phase unit is preferred because it has greater gauge capacity with a given line demand.

Single Phase Machines

Other a-c machines are single phase models which have a line demand as high as 500 kva when welding .125 inch sheet and which is best with electronic control of weld timing plus slope control, and dry disk rectifiers similar to three phase and which convert three-phase a-c to d-c.

Stored energy (d-c) electrostatic equipment has a low line demand and requires from 240 to about 2300 microfarads to weld up to .125-inch sheet. It is the most widely used stored energy machine and gives best results with high turns ratios (480 to 1) where time to peak current is around 10-20 milliseconds. Another d-c stored energy unit with low line demand is an electromagnetic welder.

Resistance welding electrodes should be made of high conductivity copper alloys conforming to the specifications of the Resistance Welding Manufacturers Association (Group A, Class 1 or 2). Use hard-rolled pure copper for special offset electrodes.

Elecrodes should be water cooled within ⅜-inch of the tip and have dome ended tips with 2 to 8 inch tip radii. Four degree flat tips with ⅜-inch to 1¼-inch diameters may be used on one side of work where surfaces essentially free of marks are needed.

For successful spot welding of magnesium: Work surface must be perfectly clean and have low uniform surface resistance (50 microhms or less); high conductivity tips must be water cooled within ⅜ inch of the tip; tip condensation must be avoided; tips must be kept clean to avoid copper pick-up on work; spot size must be uniform to produce desired strengths (see Tables 2, 3, 4).

Surface Condition Vital

Work surface condition is vital to welding results. If it does not meet specifications quality welds cannot be produced regardless of how well subsequent operations are performed.

Oiled or acid pickled magnesium parts should be used rather than chrome pickled because the surface etch produced by the latter makes parts difficult to clean. If a small number of parts are to be welded, mechanical cleaning methods — using steel wool, aluminum oxide cloth, stainless steel rotary wire brushes — can be used.

But for high production runs, chemical cleaning is economical, provides proper surface resistance, requires less tip cleaning, produces uniform welds, and allows parts to be stored for up to 24 hours before welding.

To prepare a surface for resistance welding, first vapor degrease and/or alkaline clean to remove all soil. Then remove oxide deposits with a dilute mineral acid (nitric, sulfuric or hydrochloric). A solution of .67-1.3 fluid ounces sulfuric acid per gallon of water, held in a ceramic, rubber or lead lined tank, is preferred. Parts should be dipped in this bath for 30 seconds and then cold water rinsed.

Next, the cleaned magnesium is given a low resistance protective treatment which preserves low surface resista and prevents oxide buildup during s processing. Two treatments can be u Dilute chromic acid spot weld clea a new process which is economical, to control and which causes little if staining. An older method uses chro sulfuric cleaner which does not l the advantages of the new process.

The new cleaner is made by mal a room temperature solution of ounce chromic acid per gallon of w in a lead lined steel, stainless or aluminum tank. Parts are dipped in solution for 30 seconds.

In the old method a room temp ture solution of 24 ounces chromic plus 1/16 fluid ounce concentrated furic acid per gallon of water is m in a properly lined tank. Magnesi thorium alloy parts must be imme in the solution for 5 to 8 minutes; 31B parts for 3 minutes.

After cleaning with either met parts must be rinsed in cold run water and then in hot water to facili drying. Then, if the spot welded j is to be sealed to prevent galvanic rosion, a pigmented sealing compo is squeezed out between the sheet w the spot weld pressure is applied. gives bare metal contact and relati low electrical resistance. Be sure to within an hour after applying the ing material.

For Less Power . . .

Three phase frequency converter chines are usually used for spot wel (see Table 5) because they demand power than single phase units. Sp transformers and controls take the er at line frequency and transfor into single direction pulses of cur in the welding circuit. The secon pulse is characterized by a slowly ri wave front; from 1 to 5 pulses are ally available on standard machines

Either half or full cycle wave wel can be used. A combination weld-f force permits the alloys shown in T 5 to be welded at lower currents electrode forces. The optimum wel forge force ratio is about 1:1-½ to

Lower single electrode forces and

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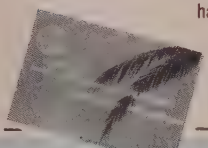

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TABLE 1: Spot Weld Spacing and Edge Distance

Sheet Thickness inches	Spot Spacing Minimum inches	Spot Spacing Nominal inches	Edge Distance Minimum inches	Edge Distance Nominal inches
.020	.25	0.50	.15	.25
.025	.25	0.50	.16	.25
.032	.31	0.62	.18	.25
.040	.38	0.75	.20	.25
.050	.41	0.75	.23	.31
.063	.50	1.00	.27	.38
.080	.62	1.25	.31	.41
.100	.62	1.25	.37	.50
.125	.75	1.50	.44	.62

rents than those shown can be used, but weld soundness is affected. However, if the defect is contained within the weld nugget there is no significant effect on spot strength.

When spot welding with single phase a-c equipment, it is best to have electronic control of weld current and timing, and to use slope control of wave form. Line voltage must be kept as constant as possible during welding (see Table 6). When using post heat with a single force system, crack-free welds can be obtained at lower welding forces and secondary currents, but at some sacrifice in spot strength.

Spot welding can also be done with stored energy condenser machines. When welding sheet .020 to .125 inch thick, the electrostatic machine should have condenser capacity ranging from about 200 to 4000 microfarads. Best results on magnesium are obtained by using a high turns ratio, e.g. 480:1. Usually, a means for reversing current direction or change in electrode polarity for alternate welds should be provided.

Welder settings vary considerably, so the values given in Table 7 are only a guide. On some machines, speed must be reduced on automatic operation to allow enough time for the charge on the condensers to stabilize, otherwise erratic welds may result.

Weld to Other Metals?

Modified resistance welding has been used to attach magnesium to other metals. A special head is used on the machine, with the part to be welded becoming one of the electrodes. Very close control of tip force is required; welding is done at high enough temperatures that a magnesium eutectic is formed, thus giving the joint excellent corrosion resistance.

Spot welding conditions vary with the type of alloy welded. In attempting to weld dissimilar alloys, differences in properties such as thermal conductivities and electrical resistivities can be compensated for by using a smaller tip in contact with the material which has the lowest resistance. Material resistance can be determined by multiplying its thickness by its electrical resistivity value.

Proper welding machine settings are important in producing strong consistent welds. Current values in the middle of the fairly wide range between "dud" and "expulsion" should be used for maximum consistency. To determine proper machine settings and pressures, make trial welds on metal of the same gauge, alloy, temper and surface preparation as the material to be welded.

When electrode pressure is applied, a small interface area has intimate contact. As current is applied and the weld nugget forms, a pressure ring is produced around the weld nugget at the interface.

To Establish Pressure . . .

Pressures are usually established by using the lower currents or condenser capacitance and voltage values suggested, then adjusting them until the desired weld size and strength is obtained. After all other settings are fixed, hold-time may need adjustment to make sure that the pressure is maintained on the weld until solidification is complete.

Penetration shouldn't be less than 20% nor more than 80% into each of the parts welded. To measure weld penetration and diameter, cut a cross-section through the weld, finish the cut surface with a fine file or emery cloth, then etch the section for 10 seconds in water solution containing about 10% acetic or tartaric acid. This etch darkens the weld zone so weld diameters and penetration are easily measured. If penetration is incomplete, alter tip size, pressure and current.

Electrode indentation is a function of electrode tip contour, pressure and current. To eliminate tip indentation on gauges up to .063-inch, use a flat tip against the outside surface of the part being welded. In heavier sheet, increase the contact area of both tips.

The upper and lower arms of the spot welding machine must be rigid enough to minimize electrode tip deflection. Otherwise such problems as inconsistent spot strengths, irregularly shaped welds, expulsion, cracking, excessive pickup and part misalignm may result.

If weld nuggets are appreciably placed, use a smaller electrode ag the side with the least penetratio clean the electrode with fine abr cloth more frequently, or clean the terial surfaces more carefully.

Magnesium pickup must be avo To do so follow these rules:

- Retract tips and polish with fine minum oxide abrasive cloth ba with a rubber block or a conto metal block. This prevents tips sticking to work.
- Clean tips regularly. Tip life tween cleanings is approximately 200 spots for AZ31B, 300-400 spot HK31A, 50-75 spots for HM21A if has been chemically cleaned using chromic-sulfuric spot weld cleaner. siderably fewer spots can be between electrode cleanings if mec cal methods are used.
- Always water cool tips.
- Make small or medium sized rather than large welds requiring currents.
- Remove copper deposits on with steel wool or a fine abrasive pound on a polishing wheel. To for copper pickup, apply a 10% acid solution to the weld and wipe a cloth. A dark spot will remain if copper is on the surface.
- On d-c equipment, use revers weld current direction for each su sive weld to extend tip life. Exce weld displacement occurs becaus the polarity effect of current flowi one direction, and is an early indica of tip fouling.

Other problems which can arise ing spot welding include expul cracking and porosity, and exce sheet separation.

Expulsion is caused by insuffi weld pressure, or using too high a current, or a poorly cleaned work face, or too small an electrode ra Solution: Increase weld pressure, crease welding current, clean work

TABLE 2: Spot Weld Strengths

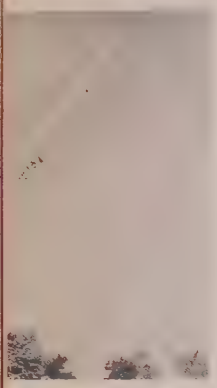
Sheet Alloy	Sheet Thickness inches	Spot Dia. inches	Shea Streng lb/sp
AZ31B	.063	.25-.30	680-8
	.032	.16-.23	250-3
	.040	.15-.25	250-4
HK31A	.063	.25-.35	660-9
	.090	.28-.36	840-1
	.125	.25-.45	880-1
	.040	.15-.25	240-4
HM21A	.063	.25-.35	590-9
	.125	.25-.45	720-1

hen a 100-ft aluminum ladder stands a 20,000-ft-lb twist . . .

(Photo courtesy Bureau of Fire, Rochester, N. Y.)

When a 100-ft aluminum ladder stands a 20,000-ft-lb twist . . .

that's Alcoa Total Ability at work!



With a 200-lb fire fighter perched at its tip, a 100-ft aerial ladder must stand up to torsional strains as high as 20,000 foot-pounds. Builder Peter Pirsch & Sons Co., Kenosha, Wis., gets the tensile strength of steel—*at one-third the weight*—from Alcoa® Aluminum Extrusions.

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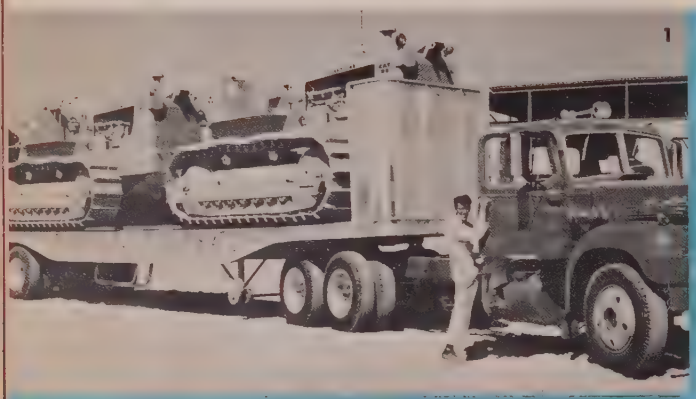

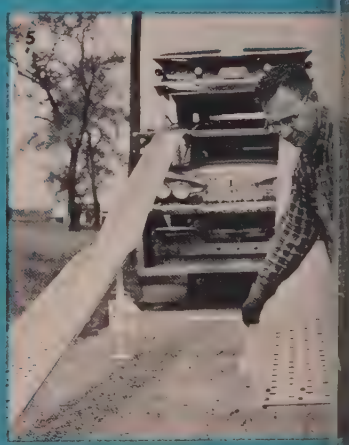

TABLE 3: ypical Shear Strength of Mag. Spot Welds

eet oy	Av. Spot Dia. (inches)	Thick-ness (inches)	Single Strength (pounds) Shear Spot
31B	.020	.14	220
	.025	.16	270
	.032	.18	330
	.040	.20	410
	.050	.23	530
	.063	.27	750
	.080	.31	890
	.100	.34	1180
	.125	.38	1530
31A	.032	.18	300
	.040	.20	375
	.050	.23	550
	.063	.27	720
	.090	.35	1200
	.125	.38	1490
21A	.040	.20	360
	.063	.27	660
	.125	.38	1220

ıly, use proper size electrode.

racking and porosity result from d work, or wrong pressure and hold s—so clean work thoroughly and st machine settings.

xcessive sheet separation will occur n electrode tips are too small or n using a high electrode force. Solu-: Increase tip radius, adjust force current settings.

o weld unequal metal thicknesses an electrode with larger contact n against the thicker material; base machine settings and weld diameters the thickness of the thinner sheet. n't exceed a thickness ratio of 2-½ for maximum consistency and high d strengths.

or greater differences in thicknesses—n as .090-inch sheet to ⅜-inch sec-ns—d-c equipment with the thicker ion against the positive electrode usually produce a satisfactory weld. n welding three pieces put the thick-part to be spot welded in the center. icknesses should not vary more than ut 25% of each other.

Weld inspection continues through-the spot welding process. Trial ds are made and broken in shear to ermine proper welding conditions. ring production, welds are inspected size and consistency, freedom from osity, cracks, expulsion or excessive et separation.

Microscopic examination or radiogra-y may be used to find cracks and rosity. In production, radiographic umination is usually specified where 0% inspection of welds is required. As mentioned earlier, magnesium can o be seam and flash welded, but both thods have been used sparingly to date. Seam welds are made in much the same way as spot welds, and magnesium flash welding equipment and techniques are similar to those used on aluminum.

Gas Welding Magnesium

Gas welding was once widely used to join magnesium parts but because of the corrosive effects of flux, its principal use now is for emergency field repair work. Broken or cracked magnesium parts usually can be repaired enough by gas welding so that the part works until it can be replaced.

Emergency welding of magnesium often requires deviation from good practice, such as welding sections that cannot be cleaned thoroughly, inadequate weld cleaning because of lack of facilities, and gas welding of cast material. Because the flux is very corrosive, gas welding is restricted almost entirely to simple butt and corner welds where complete flux removal is possible.

Small aircraft-type gas welding torches and oxy-acetylene and oxy-carbohydrogen gas are used with welding rods listed in Part 1 of this series. Two Dow fluxes are available: No. 450 has excellent welding characteristics with oxy-acetylene gas, but may cause pitting of the bead; 460 is for use if the bead isn't to be ground flush or if bead appearance is important.

Before welding, clean the repair area thoroughly and dress the edges of the defect down to clean, sound metal. Slope the sides of the defect 45°. If a defect penetrates to the wall of the casting, leave a land or root face of about 1/16-inch on the bottom side; then scrape or wire brush all oxide, paint or other coatings from the surface around the repair zone.

If It's a Casting . . .

If part is a casting, preheat it to the temperature shown in MM, Oct. '61, p. 46. Blue carpenter's chalk turns white at about 600°F, and can be used to indicate temperature. Brush flux paste on the welding rod and both sides of the edges to be welded, and adjust the torch to a neutral flame.

Melt a small area with a fanning motion of the flame and alternately dip and withdraw the welding rod into the weld puddle. Move the flame forward in a straight line, inclining the torch at about 45° to the work. Make all welds in one continuous pass if possible.

Stress relieve the repaired part in a furnace (see Table 5, Part 1) or play a gas flame over the entire part to bring it up to temperature, then cool the part slowly away from drafts. If casting requires a full solution heat treatment after welding, use the heat treat schedule in Table 6 (Part 1).

Finally, remove all excess flux when the part is cool enough to be handled with bare hands. Scrub welds immediately after completion with a stiff bristle brush and plenty of hot water.

Ideally, the parts should be given a final treatment in case any flux is remaining. Immerse parts for 1 minute in a stainless steel or similar tank holding a solution of 24 ounces sodium dichromate and 24 fluid ounces nitric acid and water to make one gallon. Rinse parts in cold running water then boil parts for two hours in a solution of 8 ounces of sodium dichromate and water to make one gallon. Rinse and dry parts carefully and apply finishing system.

Brazing Magnesium

Brazing techniques similar to those used on other metals are used on magnesium. Furnace, torch and flux dip brazing methods are employed, with flux dip most commonly used. Successfully brazed alloys include AZ31B and K1A. At present, fluxes and filler materials have not been developed for brazing magnesium-thorium and magnesium-zinc-zirconium alloys (see Table 8).

Best joints for brazing magnesium are the lap and line contact or the fillet forming type. Joints should be designed for the least clearance that permits good flow of metal; suggested clearance is from .004-inch to .010-inch. In flux dip brazing, joints should have slots or recessed grooves for filler metal so that the brazing material will not be washed off into the bath.

Use gas fired or electrically heated furnaces with temperatures automatically controlled within ±5°F. For furnace brazing a circulating furnace atmosphere is fast and provides more uniform heating. Combustion products occurring in gas furnaces reduce capillary flow and should be excluded. For torch brazing use standard gas welding torches and oxyacetylene or air-fuel gas flames.

Usually, ceramic or refractory lined internally heated pots are used to hold molten flux bath. Steel, nickel or clay

TABLE 4: Elevated Temperature Spot Shear Strength

Temp°F	Shear Strength—lb./spot HK31A-H24	HM21AT-8
70	875	825
200	875	800
300	875	775
400	875	750
500	850	710
600	600	640
700	—	510
800	—	290

(1) Based on spot diameter of .31 inch made in .063 inch magnesium-thorium sheet.

graphite pots with either gas or electric heat may be used for short or pre-production runs. Steel pots may discolor the flux but will not affect fluxing action. Holding temperatures should be capable of control within ±5°F.

Use AZ125XA rod (flow point 1075°F) as the filler material. (AZ92A rod may be used on K1A.) Filler AZ125-XA comes in wire coils (round, 1/16 and 1/8-inch diameters) and sheet (.005 and .010-inch thick) as well as rod (1/16 and 1/8-inch diameters). Filler AZ92A comes in wire coils and rod (both round, 1/16 to 3/16-inch diameters).

Chloride base fluxes should be used—for torch brazing only, Dow No. 450 (melting point, 1000°F); for flux-dip, torch and furnace brazing, Dow No. 452 (melting point, 730°F).

Use steel jigs (preferably stainless steel for dip brazing) and fixtures for holding parts in place while brazing.

Before performing any type of brazing operation, clean parts thoroughly, either mechanically or chemically.

Acid clean by dipping the parts for 2 minutes in a room temperature solution of 24 ounces chromic acid, 5-1/3 ounces ferric nitrate, and 0.47 ounces potassium fluoride plus water to make one gallon. Put the solution in a properly lined tank. After pickling, rinse parts carefully in cold running water, then in hot water for quick drying.

If you are furnace brazing, the next step would be to sprinkle the powdered flux around the joint. Mix flux paste with benzol, toluene or chlor-benzol if powder won't stay in place. After paste is applied, drive off the liquids by heating 5 to 15 minutes at 350-400°F in drying ovens or circulating air furnaces.

Next, place assembled parts in a furnace heated to proper brazing temperature (see Table 8). After assembly reaches temperature, braze for about 2 to 3 minutes.

But if you are torch brazing apply flux paste (made by mixing flux with alcohol) to the part and to an AZ125-XA filler rod. Then proceed to braze using approximately the same equipment and techniques as in gas welding. Use a neutral oxy-fuel gas or air-fuel gas flame.

For Flux-dip Brazing . . .

For flux-dip brazing use spring-loaded fixtures, self-positioning, staking or tack welding to keep parts in place during dipping. Pre-heat the assembled parts and filler metal for 1 to 3 minutes at 800-900°F. Then dip assembly into the molten flux bath for about 1 to 3 minutes. The flux bath should be maintained at the temperatures shown in Table 8.

In constant use, the flux bath may become depleted and adjustments in the total chlorine and total fluorine contents may be needed. Total chloride content of the bath is 57±3%; should the chlorine content be low, add lithium chloride as follows:

$$\text{X lbs. LiCl} = \frac{\%\text{Cl difference} \times 1.2 \times \text{total weight of bath}}{100}$$

Total fluorine content is 4±1%; should fluorine content be low, add sodium fluoride as follows:

$$\text{X lbs. NaF} = \frac{\%\text{F difference} \times 2.2 \times \text{total weight of bath}}{100}$$

Regardless of the brazing process used, complete removal of all flux is important. Wash brazed parts carefully in running hot water as soon as parts are cool enough to handle. Scrub surfaces with a stiff-bristled fiber brush.

Now dip parts for 1 minute in a room temperature solution of 24 ounces sodium dichromate plus 24 fluid ounces concentrated nitric acid (Sp. Gr. 1.4) to a gallon of water (held in a properly lined tank). Rinse parts in cold running water; boil parts vigorously for 2 hours in a bath containing 8 ounces sodium dichromate to 1 gallon of water (in a steel tank). Finally, rinse parts in cold running water then in hot water to speed drying.

Spot Welding AZ31B Magnesium

(single weld force)

TABLE 5: 3 Phase Frequency Converters[1]

Sheet Alloy	Sheet Thickness inches	Low Frequency Cycles pulse	Low Frequency Cycles weld	Electrode Weld Force lbs	Approximate RMS Current amperes	Electrode Dome Rad. inches
AZ31B	.063	3	½	1750-3400	35,200-67,900	4
HK31A	.040	1	½	1000-1800	19,600-27,900	3
	.063	3	½	2400-3600	39,400-53,800	4
	.125	5	3	5000 (min.)	65,900 (min.)	6
HM21A	.040	1	1	800-1600	21,600-30,300	3
	.063	3	1	1600-2800	40,600-53,800	4
	.125	5	1	3800 (min.)	66,700 (min.)	6

[1]Use of a combination weld + forge force will permit lower currents and electrode forces. Optimum ratio of weld to forge force is about 1 to 1-½ to 1 to 2.

TABLE 6: Single Phase AC Machines

Material Thickness inches	Time cycles	Electrode Weld Force lbs.	Welding Current amperes	Dome Tip Radius inches
.020	4-3	200-400	16,000-18,000	2-4
.040	5-4	400-600	23,000-26,000	2-4
.063	7-5	500-700	29,000-33,000	2-6
.080	9-7	600-800	31,000-35,000	4-6
.100	12-9	700-900	33,000-38,000	4-6
.125	14-10	900-1100	38,000-45,000	4-6

TABLE 7: Electrostatic Stored Energy Machines[1]

Single Sheet Thickness inches	Electrode Weld Force lbs.	Condenser Capacity microfarads	Condenser Voltage	Dome Tip Radius inches
.020	600-800	240	1400-1800	2-4
.040	900-1100	600	2200-2600	2-4
.063	1300-1600	1080	2000-2400	2-6
.080	2000-2400	1400	2000-2400	4-6
.100	2600-3000	1800	2000-2400	4-6
.125	3500-4000	2280	2000-2400	4-6

[1]time to peak 10 to 20 milliseconds; turns ratio 480:1

TABLE 8: Magnesium Brazing Materials

Brazing Alloy	Form	Density lb./cu. in.	Approx. Solid. Range—°F	Brazing Range—°F
AZ31B	Base Metal	.0639	1050-1160	1080-1100
K1A	Base Metal	.0628	1200-1202	1080-1150
AZ92A	Filler Metal	.0659	830-1110	1120-1160
AZ125XA	Filler Metal	.0682	770-1050	1080-1130

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HOW GENERAL MOTORS

casts aluminum V-8 engine blocks

Central Foundry Division's Defiance, Ohio plant was first in U.S. to successfully mass produce aluminum V-8 water-cooled engine blocks. Here's how blocks and heads are permanent mold cast.

TWO important firsts in metal casting have been scored by Central Foundry Division of General Motors. At its plant in Defiance, Ohio, the Division is successfully mass-producing aluminum cylinder blocks and heads for the lightweight V-8 water-cooled engines used in the Buick Special, Oldsmobile F-85 and offered as an option in the Pontiac Tempest.

This is the first and only U.S. foundry to mass produce aluminum V-8 water-cooled blocks. It is also the first and only foundry to successfully mass produce aluminum V-8 overhead-valve cylinder heads.

When GM decided to manufacture the new engines, it looked first to its two metal casting divisions — Central Foundry and Fabricast. Central Foundry had a wealth of experience in mass-producing V-8 blocks and heads in grey iron, and had recently entered the aluminum casting field. Fabricast had extensive experience in die casting, permanent molding and sand casting aluminum.

The consolidation of the two divisions in May 1959 provided a single source with extensive knowledge of both phases of metal casting and the experience which is vital in a major new development program.

The block and head designs adopted could not be cast by either the sand or existing die casting processes. Therefore, it was decided to utilize the well-proven semi-permanent mold process for the production of both the heads and the blocks.

Many new developments and controls in materials and processes were required before high volume production could be attained. A number of these developments and controls are described herein.

The Metal; Melting

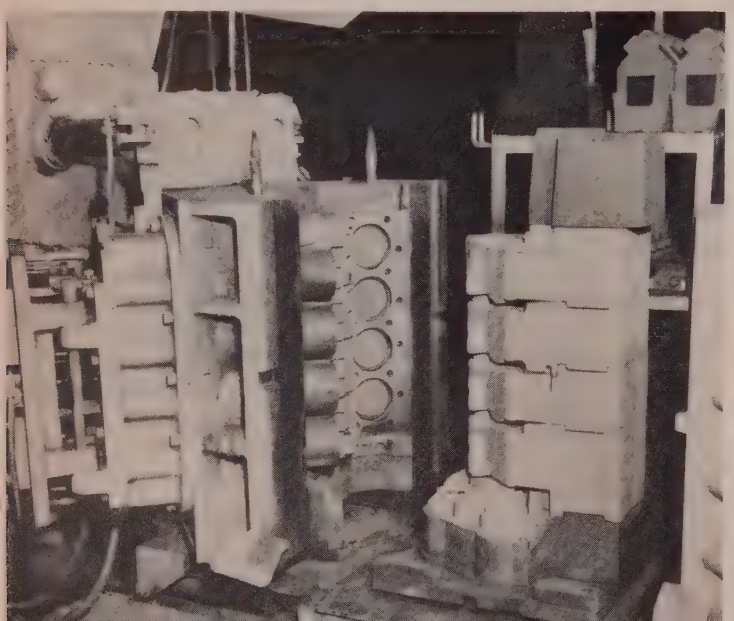
The metal used in the aluminum cylinder block and head castings is Al-Si-Mag alloy, No. 356. It is considered one of the best aluminum alloys with respect to casting properties in permanent mold work. It also possesses the desirable properties of high strength, good corrosion resistance, and pres tightness. The alloy weighs about tenth of a pound per cubic inch.

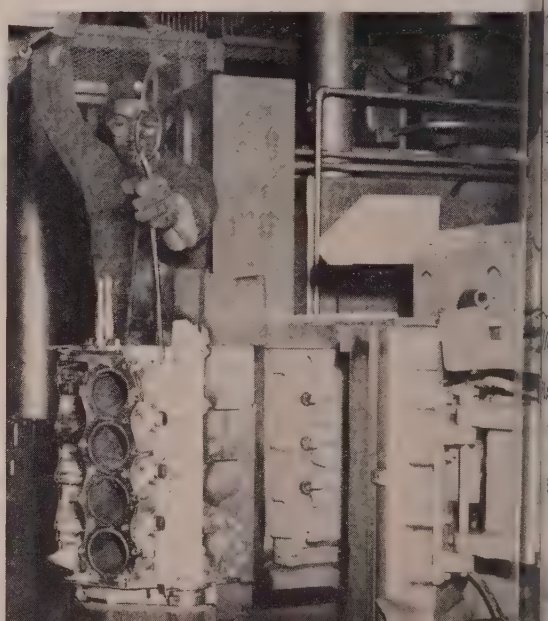
New metal, clean scrap, and metal are melted in four gas-fired 40, lb. reverberatory furnaces. The mo metal is fluxed and cleaned in the nace and samples taken for chem analysis by direct reading quantom Molten aluminum is tapped directly 1000-lb. delivery ladles and transpo by special truck to 1700-lb. gas- holding pots on the molding platfo Gas density is checked and contr in the holding pots.

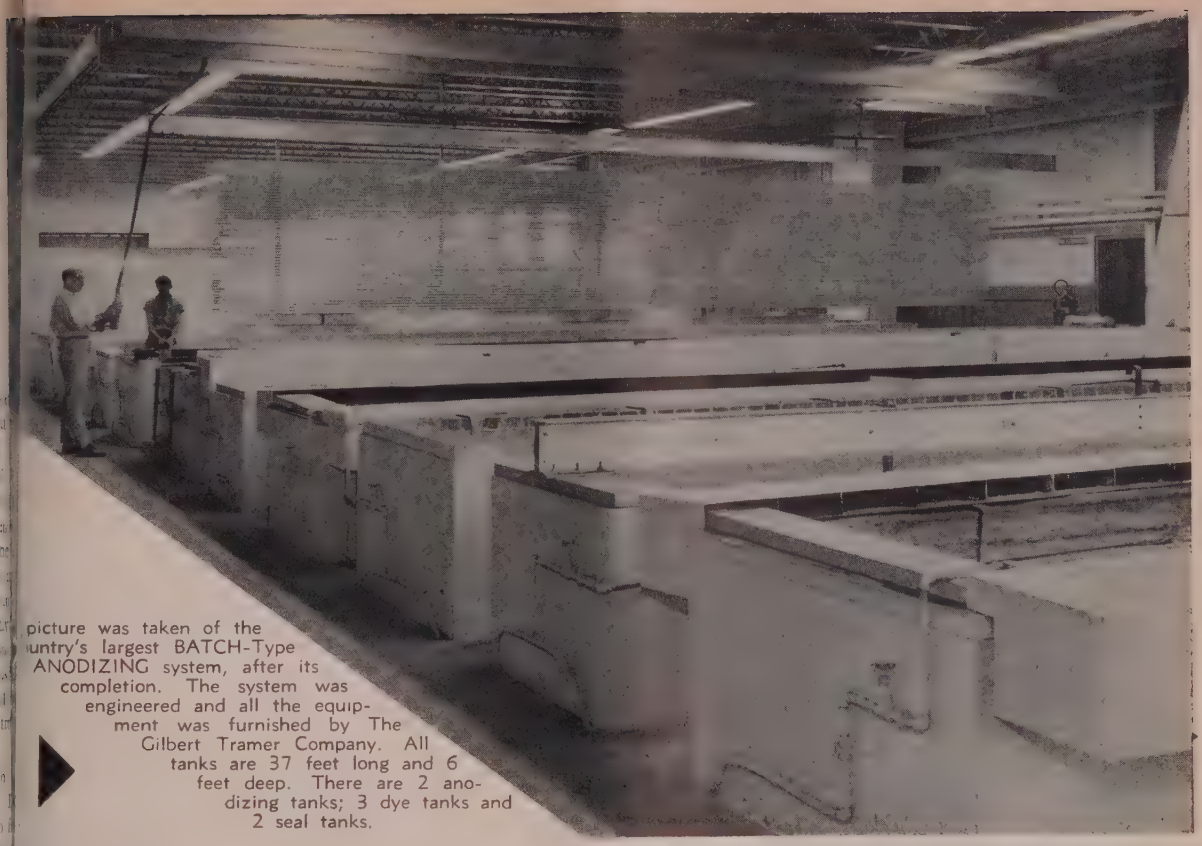
Six sand cores are required to duce a cylinder block casting. form the crankcase area and two the water jackets. Sand cores are used to form the water jacket, he and the intake and exhaust ports o cylinder heads.

The most important properties cores must have for use in alumi casting are good collapsibility so they will be easily removed after ca and low gas evolution during the ing process. For that reason, a sp urea sand mixture was developed is used for aluminum coring. Such can be made with conventional mixing and blowing equipment

Two views of semi-permanent mold machine in operation at Central Foundry Division's plant at Defiance, Ohio. At left, mold is in open position; four sand cores are in place on lower section of permanent mold; dry sand core which forms the pouring box sets atop the crankcase cores. At right, block casting is removed from semi-permanent mold.







picture was taken of the
untry's largest BATCH-Type
ANODIZING system, after its
completion. The system was
engineered and all the equip-
ment was furnished by The
Gilbert Tramer Company. All
tanks are 37 feet long and 6
feet deep. There are 2 ano-
dizing tanks; 3 dye tanks and
2 seal tanks.

Installation was made at the Weather-Tite Company in Bedford, Ohio.

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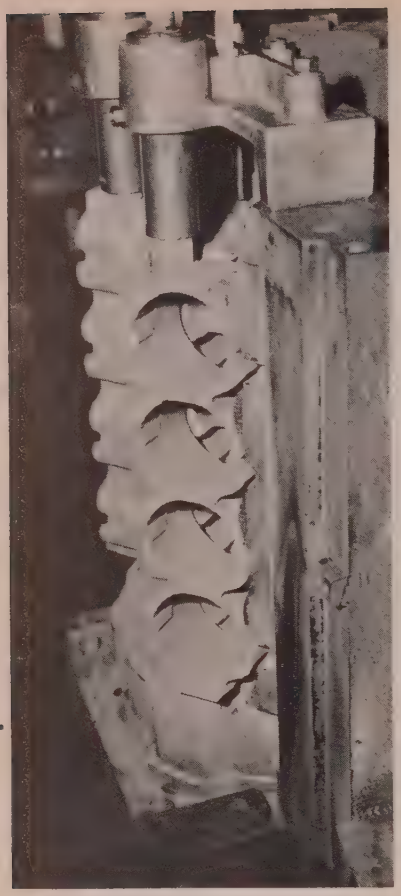


■ *Urea sand cores, which form the water jackets in aluminum cylinder blocks, are shown in position in semi-permanent mold machine. Cores are held at top by setting fixture.*

baked in conventional core ovens.

Core sand is mixed with urea formaldehyde, clay and water in a muller and discharged into a belt conveyor system that transfers it to a silo. Sand is taken from the silo and transferred to core blowing machine hoppers by motor-driven wheelbarrows.

Conventional semi-automatic core blowing machines are used. They are automatically stripped onto driers and baked in vertical core ovens. Baking time depends upon the cross sectional area of the core. After baking, the cores are processed, gaged and placed on racks for delivery to the aluminum molding area.

Cast Block Vertically

Aluminum casting operations are performed on raised platforms with belt conveyors under the platforms to remove the castings. A continuous conveyor carries cores to all molding stations. The aluminum castings are produced in special semi-permanent mold machines, which are hydraulically operated and use both water-cooled metal molds and disposable sand cores.

Unique features include pouring of the block casting in a vertical position rather than the horizontal position used in casting grey iron blocks, and complete temperature control of the metal molds. All sections of the molds are water-cooled. Thermocouples relay temperature information to a master recorder on a control panel.

Elaborate gages were developed to check mold alignment and core locations in the hot and cold state during initial setup and operation. Urea sand cores are gaged in the molds to insure proper location, and vents were provided to allow core gas to escape.

Pre-cast grey iron cylinder liners are heated and located on retractable mandrels in the molds to facilitate handling and proper location. The liners are grooved on the outer diameter to increase the bond between the aluminum and iron.

After the cores and liners have been placed, and the mold has been hydraulically closed, molten metal is ladled from the holding pot and poured into the mold. Following a brief solidification period, the mold opens and the casting is removed with an overhead hoist. It is then lowered onto a belt conveyor through an opening in the raised platform.

Finishing; Inspection

Block castings are subsequently transferred to a cooling conveyor where they cool for two hours. They then proceed to finishing operations.

Cylinder head castings are made in much the same manner in semi-permanent mold machines, except that they are cast in a horizontal position.

When cool, block castings are vibrated to loosen and remove core sand. They are transferred to a special finning machine, designed and b at the Defiance plant, which autom cally breaks off the sprue and rem flush from the cylinder bores, w openings, and main oil galley. B castings are then shot-blasted in crankcase area to remove any resi core sand.

Core sand is removed from the h on special shakeout machines. Con tional iron casting shakeouts are satisfactory due to mutilation of softer aluminum.

Next, both block and head cas are placed in transfer machines. heads are milled on the manifold and the cover rail to remove flash risers. Blocks are machined to re flash from the pan rail, front camshaft bearing holes, and crank bearings.

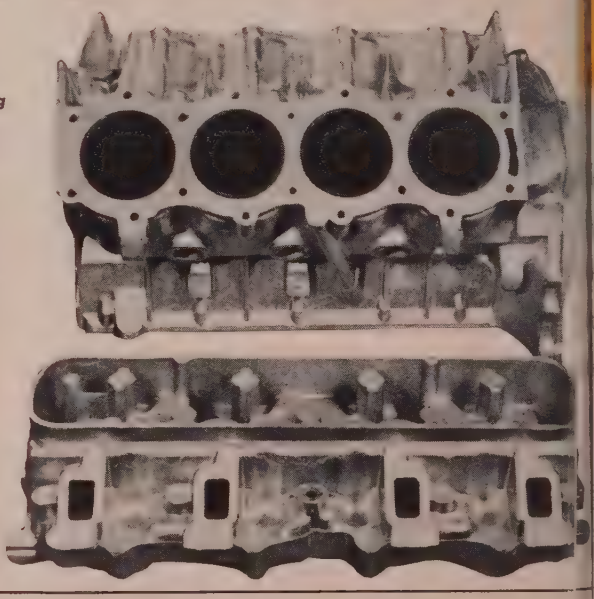
Castings then pass through a cleaning operation and are heat tre Aging for five hours at 400°F rel stresses and stabilizes the castings.

All block and head castings are merged in water, pressure tested compressed air, and gaged for di sional reliability. At this point, cyl head castings are ready for ship to the customer's motor plant.

However block castings undergo ther dimensional checks. They move a specially designed automatic qu ing machine which locates and mill and side targets in relationship t cylinder bores. A final dimens check is made on a special air-elect gaging machine which locates on milled targets and checks the loc and surface finish of 22 separate including all eight cylinder bores.

Block castings are then ready for ment to the customer.

■ *Completed V-8 aluminum block and overhead valve head casting as they appear before machining. Cylinder head shown is for Oldsmobile F-85 Rockette engine. Main machining operations are performed at the customers' plants.*



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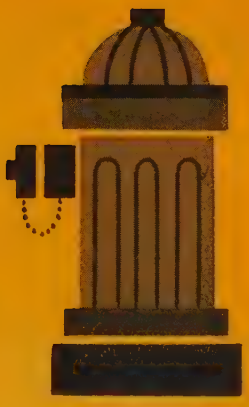

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MACHINING ALUMINUM BAR STOCK

Fluid Controls Inc. says it can machine and assemble valve bodies from bar stock within seven days after ordered. Bodies were cast, but firm says it takes a month or more to make pattern, mold and test casting.

BY USING aluminum bar stock in manufacturing many of the bodies for its line of hydraulic valves and control devices, Fluid Controls, Inc., Mentor, Ohio, has increased design flexibility to meet customers' requirements and shortened production time once a new design has been approved.

From nine standard sizes of rectangular bar stock ranging from 1 inch by 2 inches up to 3 by 6 inches, Fluid Controls can produce over 1500 different valves and control units on short notice.

"Aluminum bar stock gives us strength that is equal to or better than that of cast aluminum bodies," says R. L. Merian, sales manager. "But most important to our customers is the fact that once we arrive at a design that will give the required performance, in many cases we can machine and assemble the unit in seven days or less. To make a pattern, mold and test casting could take a month or more."

Merian cites one instance in which a large municipal user released an order for several dozen flow regulators to be used in the special hydraulic system on salt spreader trucks.

"We had anticipated their needs and prepared the basic regulator bodies," Merian relates. "In less than 72 hours, we had finish-machined, assembled and delivered the entire lot. Such quick delivery is unusual, but serves to emphasize what can be done when using aluminum bar stock."

The firm has standardized on lengths of Alcoa 2024-T4 bar stock for many of its standard and special hydraulic control devices; including several types of relief valves; check, pilot and double pilot check valves; unloading valves; flow regulators; restrictor valves; and flow dividers.

Standard Items Stocked

Over 300 types and sizes of valves and flow controls are stocked at all times. There may be 2 or 2000 of each, depending upon anticipated use.

"Despite the ample inventory of finished and partially finished valves and bodies," Merian says, "we still have to provide for special customer requirements. Our customers often ask our engineers to come up with a new device to answer some particular control problem and we can frequently pull an ac ceptable design from among the seven thousand we have already made a save engineering time and expense.

"But if the customer's problem is tru unique, we must design a special uni he adds. "Using bar stock helps us build special prototype units faster."

Bar stock is sawed into precise lengt normally up to 8 inches long. Aft light finish grinding of corners and bu ends, the aluminum blocks flow to t machining department, where holes a ports are roughed and reamed, th tapped, deburred and cleaned. Ordin ily, seven or eight different job lots through machining operations at o time, with each lot containing from to 2000 pieces, depending on orders.

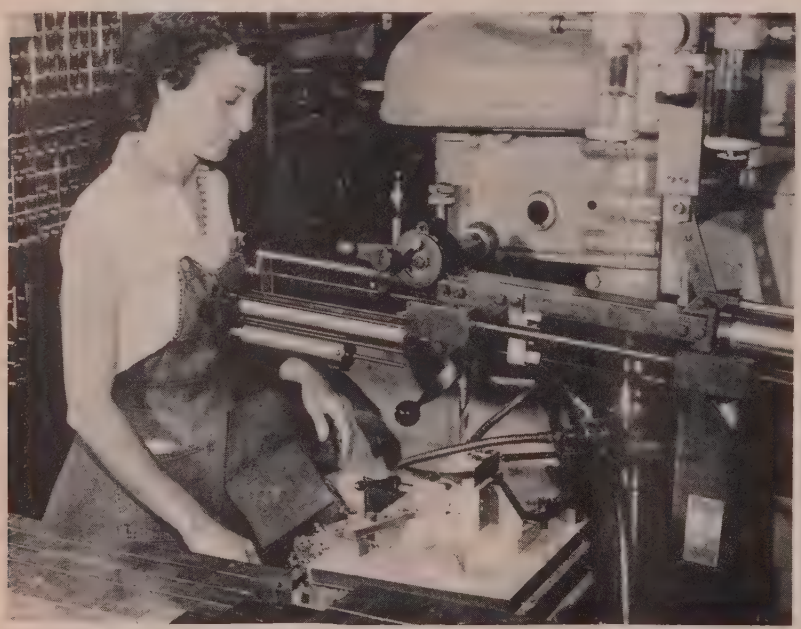
Standard ports and mounting ho are drilled and tapped in some of t bodies, which are then stored. Oth are further machined and then have p cisely honed and lapped pistons, sea or other internal components install to complete the units. Each finish valve is then tested, packaged, label and then either shipped on order placed in finished products inventory.

"In order to effectively and econo ically use bar stock," says Merian, "s eral factors must be controlled. I instance, we know that a more extens use of castings could eliminate some the machining we now perform on stock. And if we produced just a f dozen types of controls we would pro bly standardize on castings.

"But Fluid Controls, has grown cause it has the facilities, engineer and manufacturing know-how to p duce thousands of different hydrau valves and controls. It wouldn't economically feasible to have a differ pattern and mold standing for every c of the devices we make. On spec valves, bar stock gives us much m flexibility of design and manufact than if we were to limit ourselves o to cast bodies."

What are the firm's "secrets" beh its successful use of bar stock? First, machining must be precise. For ex ple, the placement, diameter and de of ports for a given valve body can vary, or valve may perform erratica

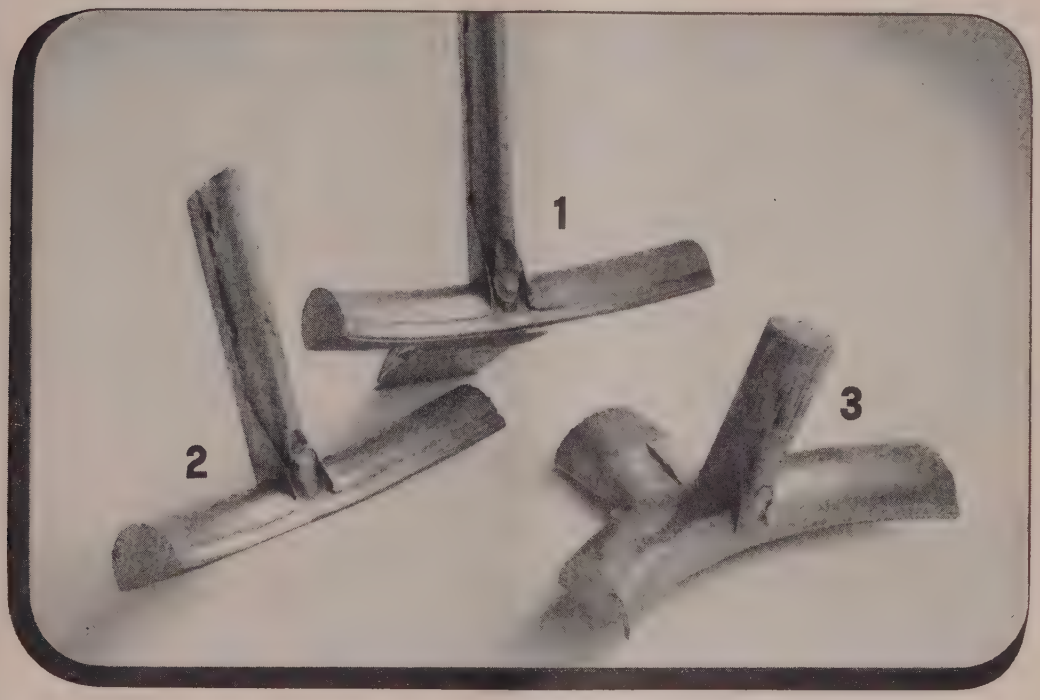
Another secret — the basic design each control device is kept as simple



■ ***Aluminum bar stock is being precisely machined for valve bodies. Partially completed bodies are stocked behind worker for further machining and processing on order. Bar stock to be machined is shown in front.***

FOR DIE CASTING

NO WELD IS QUALITY *
NO WELD IS CHEAP **



*NO WELD, a remarkable mold release, has defied duplication since it was developed 12 years ago to protect dies and ease the release of die castings. It was used to "shoot "out" the "weld" that caused flaws in the No. 13 aluminum alloy castings above.

CASTING NO. 1 was "welded" to the core. When it was removed, the "welded" portion was torn from the casting and remained firmly attached to the core.

CASTING NO. 2 shows intermediate stage in "shooting out" the "weld." Die was run hot with liberal amounts of NO WELD, which partially penetrated the "weld" and acted as a flux so that fresh metal has picked up loosened part of the "weld."

CASTING NO. 3 the final stage, shows how NO WELD has completely penetrated the "weld" and the new casting has picked up the remaining slug of metal. The "weld" would not have occurred if the die caster had started the job with NO WELD.

**NO WELD was developed to protect your costly dies. Even if it cost $100.00 per gallon it would be cheap if it protects your dies, improves casting quality, cuts down-time, and boosts your production.

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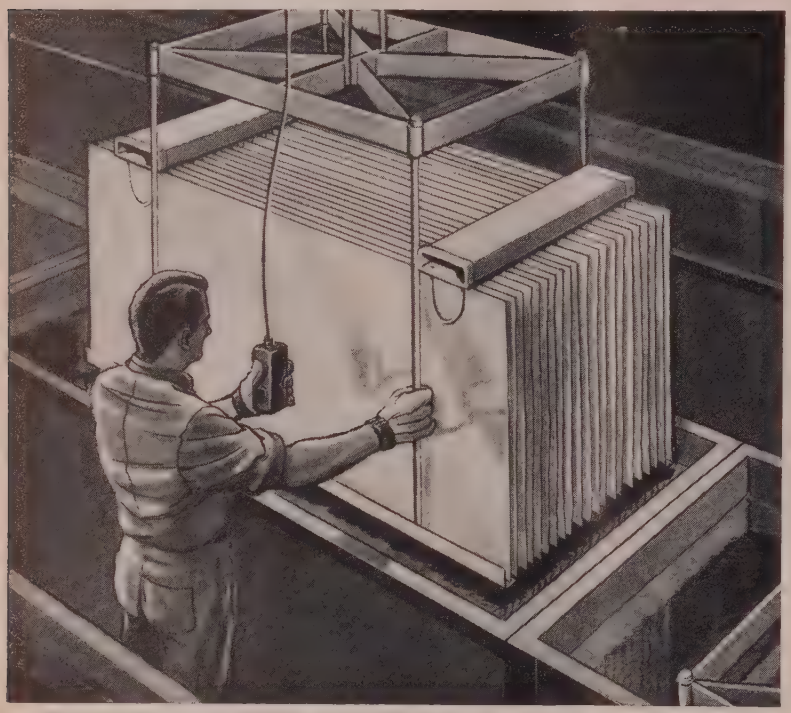

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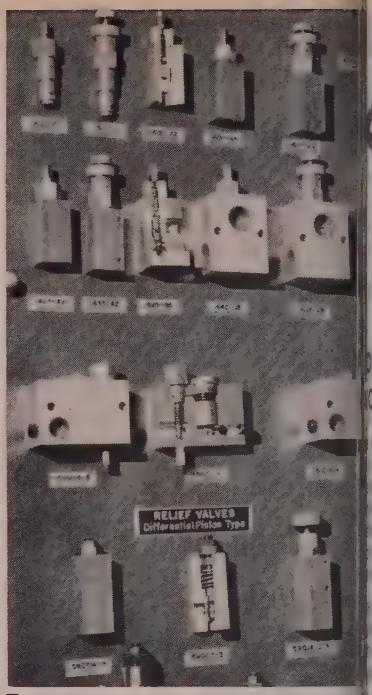

■ *Typical flow regulators, restri valves, needle valves, check valves relief valves produced from alumi bar stock by Fluid Controls Inc.*

possible. This results in a reduced p inventory through some standardiza of parts, but it has other and more portant benefits for the user. For customers get field-tested and ti proven designs that will perform for years. Standard design also lend self to many adaptations and modi tions to suit special customer needs

An example of the adaptability of plified design is a recent Fluid Con development — a double flow regula Actually two combination by-pass restrictive-type flow regulators in se the valve is constructed in a single b of aluminum bar stock.

The two regulators are situated p lel to each other in opposite direct All four ports — inlet, the two regul ports, and a by-pass port — are ou the bottom to ease installation. I regulated port is independently ad able from 0 to 15 gpm by a 12-posi detented dustproof dial. Up to th four or more regulators can be structed into a single piece of bar st

The simplified design approach quires fewer tools to obtain all pos variations. And because aluminum stock is easy to work, hardened tools last a long time.

"We began to use aluminum bar s in 1947." recalls Merian. "It has universally accepted by our custom and hydraulic valves and control vices made from aluminum bar s are now used in virtually every typ high and low-pressure application every industry."

PMD . . . and the Direct Chill casting method

›R CONTROLLED CASTING OF ›N-FERROUS BILLETS

direct chill method of casting has practically eliminated f the objectionable defects that are present in most static ngs. Because of the controls available to vary the casting itions, billets cast by this method are particularly sound free from segregation, porosity, and inclusions. Grain size structure can be controlled or varied for different appli- ıns.

ct chill casting is accomplished by pouring molten metal an open end, water cooled mold that is closed at the ›m by a movable block. As the metal solidifies sufficiently ›rm a skin, the bottom block is lowered at a controlled and the direct chill casting is in process. A wide variety ıapes and forms is possible to cast in bar lengths replac- individual castings, resulting in considerable savings in hining and fewer rejects because of casting flaws.

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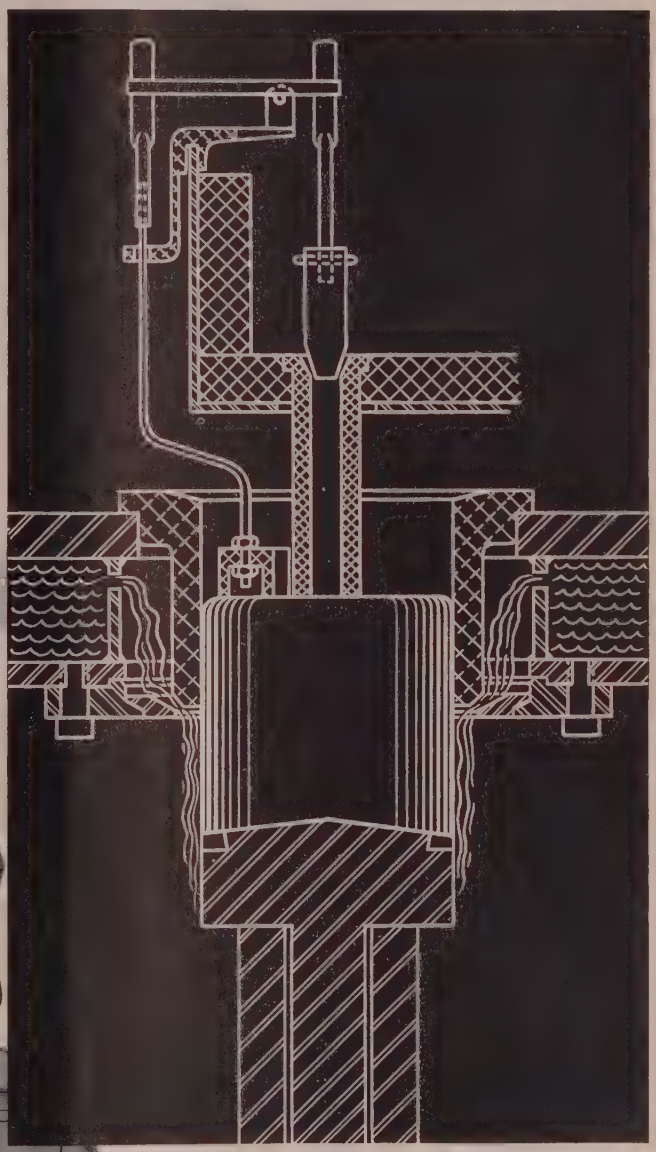

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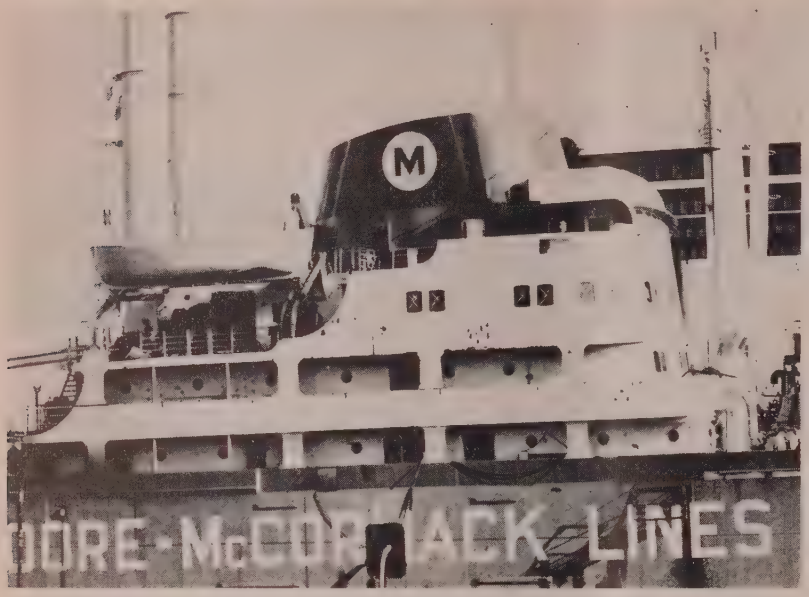

Aluminum Superstructures Boost Payload of Cargo Ships

Two new cargo ships recently completed at Todd Shipyards Corp., San Pedro, Calif., are fitted with welded aluminum deckhouses and stacks that help boost payload and improve stability of the vessels.

Built for the Moore-McCormack Lines, the SS Mormaccape and the SS Mormacglen, are 484-foot cargo liners destined for service between Great Lakes ports and South America.

Welding of the 30-ton deckhouses was done automatically, using the gas metal-arc process (formerly called MIG welding). Alloys 5052-H32 and 5083-H112 were used in deck, bulkhead plating, beams, stringers and frames. Welding wire used in most operations was Alumar 5356, supplied by Arcos Corp., 1500 S. 50th St., Philadelpha.

Use of aluminum in superstructures offered three main advantages.

1. The 3-to-1 weight saving compared with steel results in increased payload and fuel savings.

2. Stability of the ships is improved by lowering the center of gravity.

3. Welding time was about one-third that required to fabricate a steel deckhouse. Reason: The light weight of aluminum permitted prefabrication of deckhouses in the shipyard platen area where automatic equipment could be used. If steel had been used, the job would have required manual welding of a large number of pieces aboard ship—a time-consuming job.

After each deckhouse was completed it was hoisted aboard ship by two 25-ton cranes. Both vessels are primarily dry cargo ships with facilities for 12 passengers and a crew of 60.

Develop Improved Method of Welding Thick Plate

Thick aluminum plates can be welded more efficiently and economically by using large diameter welding filler wire. The technique, developed by the Department of Metallurgical Research of Kaiser Aluminum & Chemical Corp., is expected to be used in the production of armored military vehicles, big storage tanks for liquid gases, and structural and marine work, according to Paul Zeigler, director of metallurgical research.

"Welding costs with the new method are reduced because filler deposit rates of 15 pounds per hour are readily attained, as compared to 5 to 10 pounds for conventional gas metal-arc welding," Zeigler explained.

He also pointed out that suitable welding equipment is readily available because the method uses, with simple modifications, submerged arc equipment of the type commonly used for welding steel.

Butt weldments in 3-inch plate have been made in alloys 5083 and 5456, consistently achieving mechanical properties sufficient to meet ASME boiler and pressure code requirements, according to Kaiser. Weld ductility is increased. Procedures have been established for making fillet welds, too.

The new method uses filler wire in diameters up to 7/32-inch, compared with a maximum diameter of 1/8-inch generally used in gas metal-arc (MIG) welding of aluminum. Submerged arc equipment used in the steel industry can be modified for the process by replacing the flux and contact tube system with a water-cooled inert gas welding barrel of sufficient capacity.

The large-wire process uses much lower current density—15,000 to 30,000 amperes per square inch compared with 50,000 to 100,000 amps psi for conventional welding with smaller fillers. Only two welding passes are generally needed on plate up to 1½ inches thick.

Another recent development in the Welding Engineering Branch of the company's metallurgical research department is the use of high current densities to weld plate up to 2 inches thick in only two passes with 1/16-inch filler wire. This is accomplished with standard automatic MIG equipment, modified for use in currents up to 450 amperes and 40 volts, according to Zeigler.

Reynolds To Make Fruit Juice Cans

Reynolds Metals Co. will manufacture finished aluminum cans for frozen citrus juice concentrates for direct sale to packers.

Three can assembly lines with a combined monthly capacity of 30,000,000 cans will be operating during the next Florida juice packing season, mid-December through June, according to Richard S. Reynolds, Jr., president. Installation will be at a Florida site to be announced later.

Lithographed aluminum sheet will be fabricated can ends for the assembly

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eration will be produced on the firm's can stock facilities at Listerhill, Ala. Reynolds has been processing, fabricating and lithographing aluminum can stock for more than a year to supply can assembly lines installed at Florida juice packing plants of Minute Maid, Birds Eye and Winter Garden.

The Reynolds aluminum cans will be priced competitively with containers made of double-reduced or "thin" tinplate in both the six and twelve ounce sizes.

"We consider this move necessary to insure a supply of finished aluminum juice cans priced on the basis of raw materials economics," Reynolds said.

Four can assembly lines now are operating in the plants of Florida juice packers, all using aluminum can parts supplied by Reynolds. The combined monthly capacity of these four and the three to be operated by Reynolds is 70,000,000 cans, about half the seasonal monthly requirements of the Florida frozen juice concentrate industry.

Aluminum cans were introduced to the frozen juice concentrate industry in May of 1960. Reynolds mounted can assembly equipment in a trailer, drove it to Florida, and produced about 7,000,000 aluminum cans in a demonstration observed by every major juice packer in the state.

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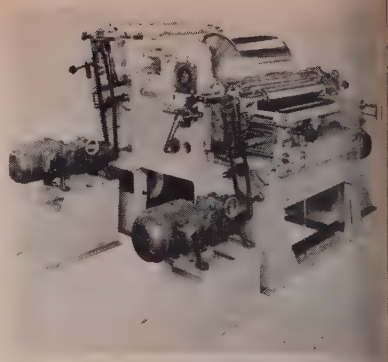

New Roller Coater Features Precision Rolls

Problems of uneven paint distribution in metal strip coating lines are claimed to be solved by a new precision roller coating machine developed by Gaswa Corp., 6463 N. Ravenswood Ave., Chicago.

Prior to the introduction of the new coater, the lack of a high degree o concentricity in coating rolls plagued strip coating lines in two ways.

First, a uniform paint film thickne could not be held accurately enough and second, this resulted in the appli cation of films heavy enough to avoi shadowing and other imperfections i the finish on the metal strip due t lack of concentricity. This heavier coa resulted in a much higher paint cos than would be required if a thinner more uniform paint film could some how be applied. Thus the problem re solved itself into maintaining highes possible concentricity in the rolls.

This is accomplished in the Gaswa machine by precision grinding of coat ing and doctor roll on centers and thei also operating them on centers in th coater itself instead of with journa boxes. In this way paint films can b metered to extremely close tolerances with very thin films.

The new coater is also designed t prevent undue loss of metal stock i the form of scrap and loss of produc tion during changing of rolls. With the new coater it is possible to change rolls quickly (average time 60 seconds) be cause the machine has been designed with retractable centers which may be moved away or brought up to the roll in very much the same way this opera tion is performed on the tailstock of a lathe. When changing rolls the operato simply retracts the center by means of adusting screw device, removes and re places the roll, brings the center back up tight to the roll and locks it in, still maintaining perfect concentricity.

A further design incorporated into the machine to maintain precision control of the paint film is the conical-headed construction of the large back-up rolls.

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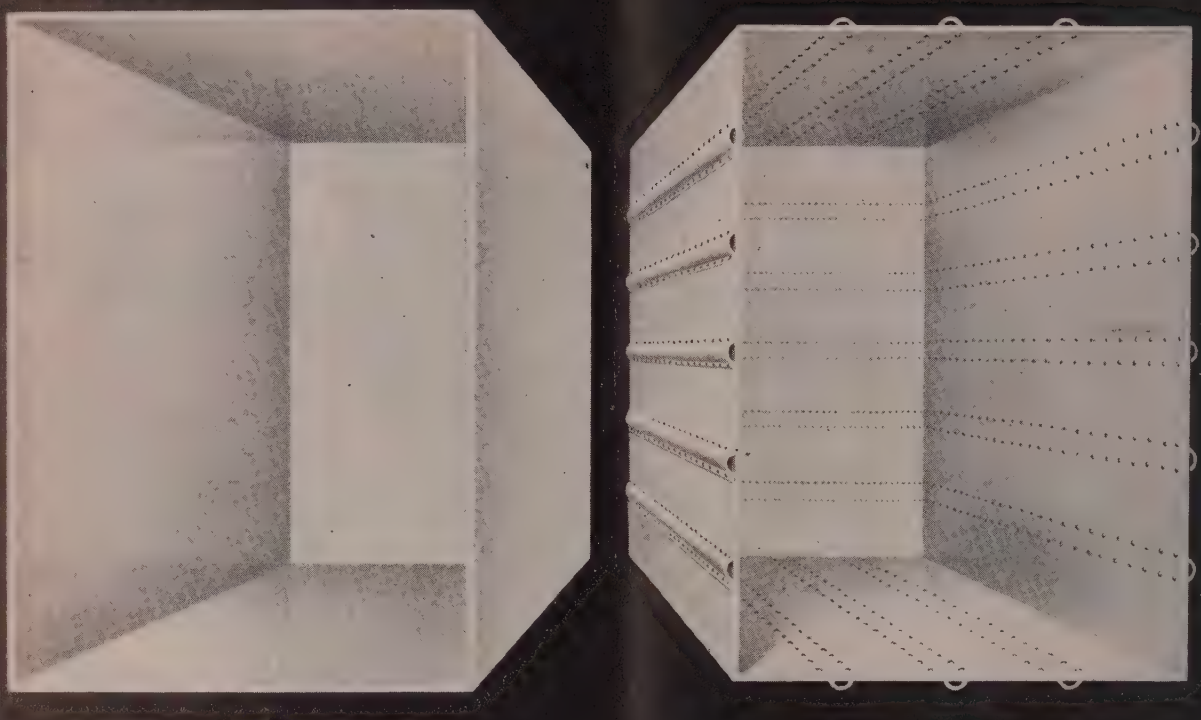

NO-RIB

RIBBED

Thick-gauge magnesium sheet is so rigid that time-consuming rib stiffeners and fasteners are eliminated. Yet the magnesium panels are light and strong, resist dents and punctures better than thin-skinned ribbed construction.

WHICH HIGH-STRENGTH DESIGN WEIGHS LESS... COSTS LESS TO BUILD?

Magnesium no-rib, of course. By increasing the sheet thickness slightly, designers of containers and vehicle bodies get a tremendous boost in rigidity, thus can eliminate stiffening ribs. And since magnesium is the lightest structural metal, the resulting unit weighs less than conventionally-designed structures using other metals. (No-rib design in other metals introduces a severe weight penalty.) Magnesium no-rib structures are smooth-walled, minimize crevices for water seepage, have greater cubic capacity pound-for-pound than ribbed units. For detailed information on using magnesium no-rib construction for fabricated units of all types, write THE DOW METAL PRODUCTS COMPANY, Merchandising Department 1108CQ11, Midland, Michigan.

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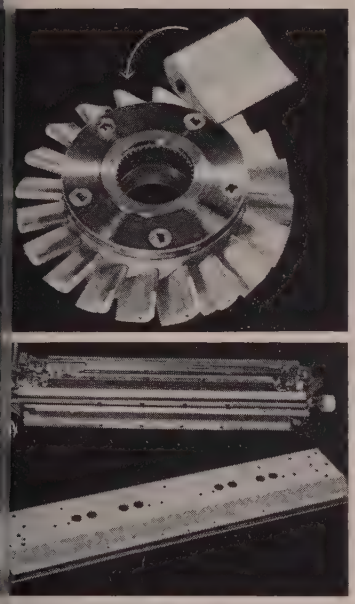

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w) Electric typewriter carriage part.

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Houseboats Have Rugged, Welded Hulls

A new line of houseboats feature an all-welded stressed aluminum skin hull, a unique stern end power pod adaptable to inboard or outboard engines, and new cabin interiors with complete facilities for sleeping, cooking, and bathing.

Designed by Richland Mfg. Co., Springfield, Mo., the flat bottom boats draw only 24 inches, including propeller. They are available in two standard sizes: 40 feet long by 14 feet wide including 2-foot wide catwalks on each side, and the popular 30-foot long by 10-foot wide model. Each boat can comfortably accommodate six to eight persons.

The all aluminum hull, made of .091-inch thick aluminum 5002 marine alloy sheet, is welded for rugged watertight operation. Four formed keel plates with contoured noses placed on 24-inch centers along the hull length and nine longitudinal stringers form the main internal hull stiffeners.

On the large luxurious houseboat, the aluminum weathertight cabin with jalousie windows and doors, measures 26 feet long by 10 feet wide with a 79-inch ceiling. The after bedroom and forward living room, including steering and instrument panel, are separated by a complete galley with full size butane-powered stove, electric refrigerator, sink, and cabinets on the port side and a fully enclosed marine toilet and shower facilities on the starboard side.

Aluminum Shingle Machines Now Being Leased

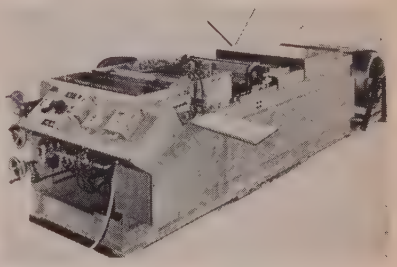
With today's home designing and building trend favoring the long, low silhouette, roofs and rooflines have become more noticeable, more important to the modern home buyer. He wants a functional, attractive roof.

International Aluminum Corp., Ryan Airport, Baton Rouge, La., reports that the Deville shingle is the first aluminum shingle to be used successfully for both roofing and siding purposes, providing home builders (and home owners) with a permanent, low-cost, maintenance-free shingle that is distinctly smart looking.

While present plans call for a continuance in shingle manufacturing and merchandising the company reports that Deville shingle machines are now available to aluminum products manufacturers and other companies on a lease-royalty arrangement, according to J. C. Murphy, president of International Aluminum.

"We're already leasing our Deville shingle machines to one of the biggest aluminum companies in the country," Murphy said. He added that International Aluminum holds the exclusive patent rights to both the Deville shingle and the Deville machine itself.

The shingle is said to be unique because it is more easily produced and installed; lighter in weight; possesses a

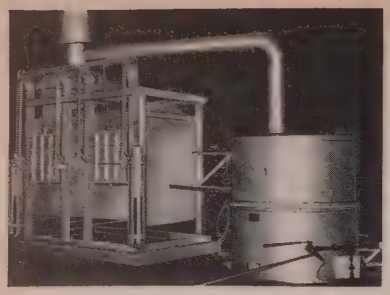


greater radiant heat reflective quality, and is more economical.

"The Deville shingle is striated," Murphy said, "suggestive of wood, which strengthens it and makes it glare-proof as well as good-looking." The shingles are produced in a wide variety of colors with a baked enamel finish.

Deville Lifetime aluminum shingles can be turned out on the Deville machine at the rate of one 48-shingle square per minute—or, about a shingle every 1.25 seconds. The striated aluminum is supplied machine-ready in 1,000- to 2,000-lb. coils of 5005 alloy, 32″ wide and .019 or .024 thick.

The Deville machine (1) cuts the nail tab; (2) forms two end tabs; (3) cuts the shingle, and (4) forms the top and bottom locks and ejects the shingle—all in just over one second.



Furnace Reclaims Aluminum From Bi-Metallic Parts

A new scrap furnace that will recover non-ferrous metals that are bonded to other metals has been developed by Warwick Industrial Furnace & Engineering Corp., 9219 Park Ave., Franklin Park, Ill. The operation of this furnace is simple and efficient. Used or scrapped parts that are made of bi-metallic components are fed into the first furnace onto a hearth where the correct desired temperature is applied causing the metal that melts at the lower temperature to flow from the first furnace (sweat) into the second furnace (holding) where it can be readily processed and refined, then poured into pigs. The remaining metal in the sweat furnace is then removed and the process repeated.

This combination is excellent for reclaiming die castings with steel inserts or permanent mold castings such as automotive pistons with steel struts, and many other uses. It is built in sizes to handle from 200 to 2000 pounds an hour, and may be fired by gas, oil or combination oil-gas.

New Solvent Ideal For Paint in Aerosol Cans

A unique, stabilized methylene chloride by The Dow Chemical Co., Midland, Mich., has particular advantage in aerosol-type pressure paints and in paint systems in contact with aluminum or combinations of aluminum with iron, the company said.

Called Methylene Chloride-S, the solvent is being offered for customer evaluation by Dow at the same price as technical grade methylene chloride, $0.1125-$0.1250 lb., in tank car to truckload drum quantities.

Dow said Methylene Chloride-S has the same strong solvating effect on resins, and the same non-flammability, low toxicity, and general property behavior as does the technical product.

"Methylene Chloride-S has special utility in pressurized paints because the specially designed inhibitor system reduces attack on aluminum, reduces catalytic reactions triggered by iron, and gives superior stability in solvent blends with toluene and a range of aromatic solvents," said R. A. Lindsay, manager of Dow's Technical Service and Development Department.

New Campbell Dry Soup Has Easy-Open Package

After extensive research and test in the U. S., Canada and Europe, Cam bell Soup Co. has introduced a line dry soup mixes in a new aluminum that can be opened easily by hand.

The new canned dry soup mi carrying the brand name, Red Ket will supplement the 29 condensed s varieties, the 20 ready-to-serve varie and the eight frozen varieties that h made the 92-year-old company largest producer of soups in the wo

One problem was to devise a met of packaging that would meet their quirements. Campbell developed a

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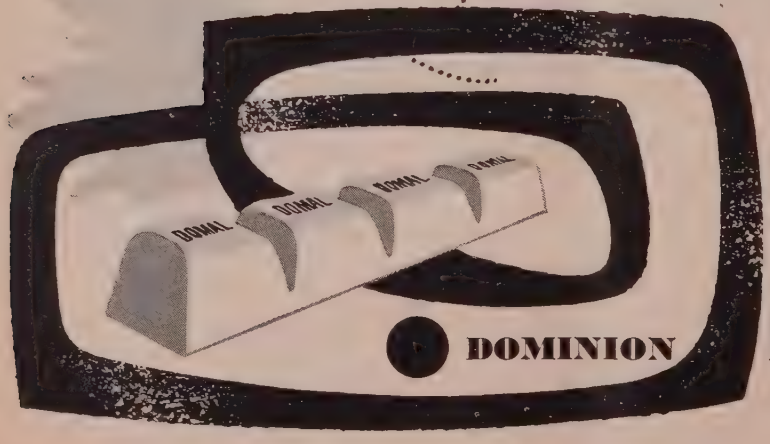

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metically-sealed, aluminum can for the dry soup mixes. It meets their standards both for maintaining product quality and for physical ruggedness. The housewife needs only to pull a tab to open the new container. Large scale tests were made of the containers and Campbell is optimistic that their convenience and their construction will have wide appeal to the housewife.

The new dry soup mixes are made at Camden, New Jersey in a new multi-million dollar installation involving special drying processes (including freeze-drying) and utilizing unique and new packaging facilities.

Extruder Will Expand "Across the Board"

General Extrusions, Inc. has announced plans for a $250,000 expansion program, including construction of a 14,000 square foot plant adjacent to its present plant on Lake Park Road, Youngstown, Ohio. The plant will cost about $100,000 and increase GEI's production area by 45%, according to company president Fred Schuler.

The new plant is slated to house GEI's greatly expanded anodizing, painting and finishing departments, as well as the packing and shipping sections. Some $150,000 will be invested in new equ ment and machines.

"We are a small business and a qu ter of a million dollars is a big inv ment for us," Schuler explained. He dicated that the decision to expand Youngstown was reached "after mu soul searching." Free plant facilities been offered by some southern sta he added.

"However, assurances that wages pay here will be kept at a level to all us to be competitive were a big factor helping us decide to stay here," Schu explained.

Schuler founded General Extrusi in 1950. The company specializes i complete fabricating service. Empl ment is 130, but the company expects take on another 25 people when the pansion program is completed.

Schuler hopes the new building be completed within 60 days.

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Versatile Aluminum Pane

Wall-to-wall ceilings, luminous f ing panels, and fluorescent incandes lighting fixtures are a few of the a cations forecast for the new Bohn line of aluminum louver panels rece unveiled by Bohn Aluminum & Corp., Detroit 26, Mich.

Developed primarily for the ligh industry, the panels are sold and tributed by Lighting Accessories, 19174 James Couzens Highway, De 35. The louvers are produced in a riety of finishes, including natural, s color anodized and baked white ena

Bohn engineers say the panels are idly constructed by mechanically locking precision-cut aluminum Patterns include rectangles, diam circles and hexagons. Other shape available for specific designs. Pr models are in eggcrate louvered p of .015 or .025 aluminum strip.

Supporting suspension systems truded aluminum are available for struction of entire ceilings.

Loading Oven Speeds usion Die Changing

ew top loading die heating oven gned for heating extrusion dies to ratures up to 1100°F. Built by Inc., 201 Leverington Ave., Philia, it is said to speed up die hanconsiderably.

gged construction permits handling s weighing up to 4000 pounds, and rature uniformity is aided by a ntal air recirculating fan.

ipped with automatic indicating ols, counter-weighted door, and F & F ribbon type heating ele-, the oven is available in a range es. The model illustrated is 26 wide, 28 inches high and 42 long.

rmont Beefs Up s Organization

rmont Aluminum Co. has organand expanded its sales organizato meet the demands of its new inum sheet rolling facilities. Fair-, a Cerro Corp. subsidiary, dedicatnew mill September 30.

der the new organizational plan, new posts have been created—Man- Sales Administration, filled by ence M. Campbell, and Manager, Sales, held by A. J. Snider. Both executives will report to W. Brad-Blair, vice president, sales.

ce 1958, Fairmont Aluminum has d nine new sales offices and has st tripled the size of its field selling . In addition, seven warehouse disitors in five cities have been added rry the Fairmont line.

les vice president Blair said: "We introduced a new 'Quadrant Sys- of sales service whereby certain raphical regions, each of which com- about a quarter of the nation's r consuming areas, fall under the nsibiltity of a single top-level sales inistrator. The new system was de- so that each customer or prospec- customer has an administrator famil- with its specific needs to insure apt follow-through from both service manufacturing standpoints."

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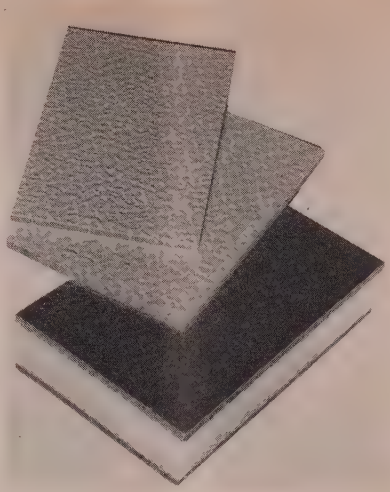
Building Panels Get Textured Porcelain Finish

A new line of porcelain finished aluminum architectural panels in 18 colors and with stucco embossed texture, was introduced recently by Mapes & Co. of Lincoln, Neb. The line will include veneer, insulated and glazing panels in widths of 2, 3 and 4 feet and lengths from 4 to 10 feet.

The aluminum panels are priced to equal porcelain enameled steel panels, with square foot retail prices for the standard veneer panel ranging from $1.60 to $1.80 and for the insulated panel from $2.65 to $2.80. As the lighter weight of the aluminum panels, one-third less than steel, will provide both transportation and installation savings, installed costs of the aluminum panels may actually be lower than for steel, according to J. S. Mapes, Jr., president.

The new panels have passed the Forest Products Laboratory accelerated aging tests and carry a porcelain enamel guarantee conforming to the specifications recommended by the Porcelain Enamel Institute, Architectural Division.

"The aluminum panels can be sawed, drilled or punched without chipping or spalling the porcelain coating," Mapes said. "In addition, architects need not be concerned about unsightly rust stain arising from bare edges or drilled holes. Porcelain enameled aluminum will stand up under a surprising amount of abuse."



The textured surface of the three building products is porcelainized with a low-gloss finish which greatly reduces objectionable shadow reflection and distortion. The back skin is supplied with a low-gloss white primer baked enamel paint, eliminating applicator finish.

The new panel products, made from .020-inch thick aluminum enameling sheet, will be porcelainized and laminated to various core materials in a new facility at the Lincoln plant.

Mapes & Co. will market the aluminum panels through glass and sash front dealers and also direct to large curtain wall fabricators for use in school, office, institutional and other building applications.

Aluminium Limited Sales Opens In New N.Y. Location

Aluminium Limited Sales, Inc., the sales subsidiary of Aluminium Limited, announced that it has completed the transfer of its New York headquarters to new offices at 111 West 50th Street in the new Time & Life Building. The offices occupy the entire 45th Floor.

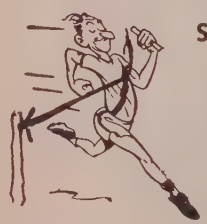
Eric F. West, president of the company, stated that additions to the company's sales and sales development groups had necessitated the move to larger quarters. "In the careful planning of our new offices," Mr. West added, "the emphasis has been on improved efficiency so that we will be able to provide even better service to customers."

Printers Ought To Like This Cool-Running Gear

Aluminum gears have special application to the printing industry, according to Le Baron's, 145 Franklin Turnpike, Waldwick, N. J., a metal working firm that pays particular attention to the field.

"We have developed a new aluminum gear which we think will be of tremendous value to the printing industry," says Chester Le Baron. "Our aluminum gears have several advantages over the steel and castings now in use. The new gears will wear longer, run cooler, require much less maintenance, be easier, and will be competitive in price."

Aluminum gears make possible



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COLORED METALS, INC.

PRE-COATED ALUMINUM COIL

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* THICKNESS 0.008" TO 0.61"
* ONE COIL OR CARLOAD

PRE-COATED STEEL COIL

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FOR FAST SERVICE & FINEST QUALITY:

COLORED METALS, INC.

P. O. BOX 10254 — TAMPA, FLORIDA

ion of presses at higher speeds
he friction and noise factors are
ized, he said. This accelerated
ion increases production thereby
sing job costs. A light metal gear
aluminum's strength lends itself
y to better balancing because of
educed mass.
en at the outset an aluminum gear
ess because shipping costs are half
of the heavier metals. Their main
em heretofore was the price differ-
which existed between aluminum
teel casting," Le Baron said.

rusions a 'Natural' Trade Show Booths

ecial aluminum extrusions have en-
l a trade show supplier to cut by
the cost of labor in setting up ex-
ion booths.

addition the anodized extrusions
ide a framework that provides for
ally instant installation of special
ts panels or changes in color.
ogers Industries, 14575 Meyers Road,
oit, produced and fabricated the
usions for Show Service Inc., New
.. First used in the 1962 World
le Fair in the New York Coliseum,
ons of the panels have since been
in other expositions. Patents and
rights on the modular design of the
ework have been sought. Part of
France exhibit is shown above.
ow Services specified a rigid frame-
k type of booth material, which
d be erected rapidly from a mini-
n of parts and with a minimum of
r. In addition, the skeleton would
e to provide means for rapid re-
al and installation of panels and be
ptable to a wide variety of special
cts panels.
ogers Industries produced three
c extrusions that met all of these re-
rements. In addition the extruder
and drilled the sections to fit the
dular scheme and supplied all fas-
ers.
The result was a king size Erector Set,
é 21 tons in it. And it proved as
satile as an Erector Set.
The sleekly designed frame enables
kmen to instantly change colors and
tures of standard size solid and per-
ated hardboard panels. By using
tain panels, decorators could use the
minum members as a picture frame.

aluminum tubing

from the "Mill Next Door"

No matter where you're located, if you use aluminum tubing, you can consider *Pfister* as the "Mill Next Door". That's how our customers have come to think of us — They're used to exceptional service—mill production in twenty-four hours on emergency requirements. We carry stocks in five cities —even carry stocks right next to customers' plants when usage warrants it—and quality is controlled as if manufactured right under your own roof.

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ALUMINUM TUBING
Drawn • Welded • Butt
Rounds • Squares

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Improved Die Casting Alloys Announced by Apex

A new family of aluminum die casting alloys, said to deliver benefits never before available on a consistent basis, are available for immediate delivery from the Chicago, Cleveland and Los Angeles plants of Apex Smelting Co. Named Allcast, the alloys are being supplied to present Apex customers without premium charge, Apex said.

Describing the alloys as "the most significant development in (Apex's) 38-year history," the company said the materials have been submitted to a number of die casters for thorough testing under "tough job" conditions.

Benefits reported by these users include increased fluidity, minimum sludge formation, less porosity and cold flows, less lubricant needed, less tendency to solder, more shots per hour, lower casting temperatures, extended die life, brighter surface finish, better machinability, and greater pressure tightness.

Apex is headquartered at 2537 W. Taylor St., Chicago 12.

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Largest batch type anodizing system in the United States.

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Natural SATIN or GOLD finish.

Expertly trained personnel, under supervision of John Kopp, nationally known anodizing authority.

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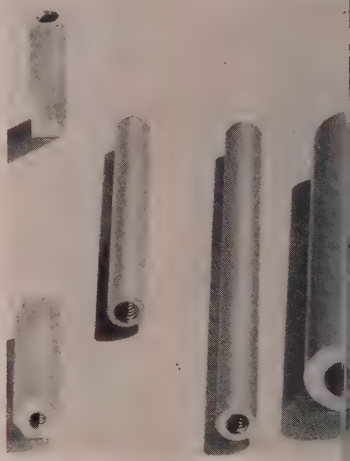
Fastener Firm Expands Line

New thread cutting screws have added to the line of Southern Screw Statesville, N. C. Now included Types 1, 23 and 25.

The cutting edge and chip cavi the tapered entering threads of screws allow removal of material to a close-fitting mating thread. Thread ting screws require minimum dri torque and withstand loosening du vibration and temperature varianc

Types 1, 23 and 25 Thread Cu Screws are available from Sout Screw Co. in all standard sizes, styles and finishes.

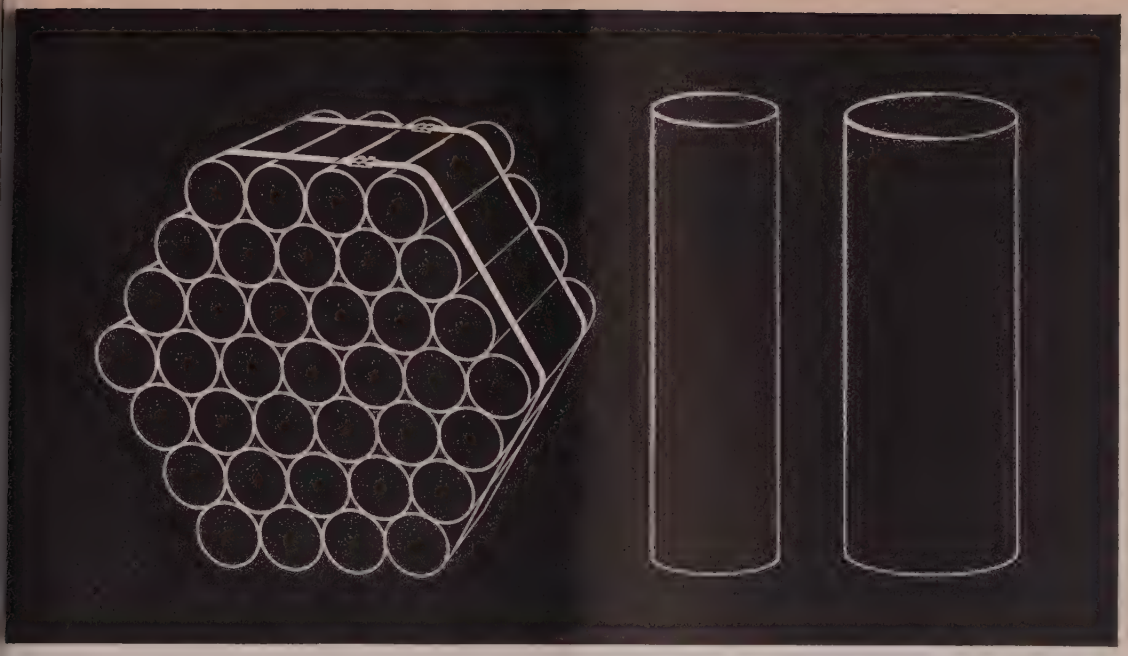


Standoffs; Spacers; Posts

A complete range of stan spacers, and posts in a wide ran sizes, shapes and materials is being by Angler Industries, Inc., 75 Win St., Newark 4, N. J. A wide selecti finishes is available at no extra co

Angler spacers are used for su tion or support of components or tural members in electronic assem gear trains, mechanisms, multi-se switches, and many other applica The tubular spacers have precisio chined ends and accurately cont lengths and are available in r square or hexagonal outside dian

A choice of aluminum, brass, sion-resistant steel or cold rolled is available. Selection of the right spacer for any given application is plified by a wide selection of sizes and protective finishes.



What's newest in Alcoa Extrusion Ingot:

HERE ARE SOME RECENT DEVELOPMENTS OF INTEREST TO EVERY EXTRUDER:

THREE FROM 6063 • Which characteristics of these versions of Alloy 6063 do *you* need? *C989 homogenized* extrudes 25 to 50 per cent *faster* than standard 6063. *C872 P homogenized* has higher tensile and yield strengths, improved hardness for structural solids. New *C914 homogenized* extrudes nearly as fast as C989, much faster than C872.

TWO BRIGHT IDEAS • Where a highly reflective finish is needed, Alloy 6463 provides it *and* the mechanical properties of 6063. Want an even brighter finish? Get it in Alcoa's new *6563*, if you can give a little in mechanical properties.

THREE FROM ONE • For architectural applications, *one* alloy, 4543, anodizes to *three* shades of gray: light, medium or dark.

ONE FOR ENAMELING • Developed by Alcoa especially for porcelain enameling, C58 provides good adherence characteristics combined with the mechanical properties of 6061 Alloy.

FIVE IN TEN SIZES • Need small billets in C989, C872, C914, 6463 or 6563? Alcoa tailors them in ten diameters: 3, 3¼, 3½, 4, 4 7/16, 5⅛, 6⅛, 7, 8, 9 in.

ALL IN NEW BUNDLES • Compact, rectangular bundle on runners keeps ingot off floor and out of dirt; makes fork-lift handling and storage easier. Paper cover under straps protects against dust.

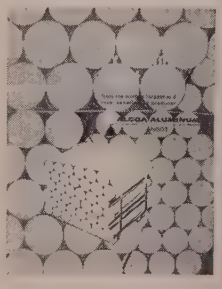
Extruders who use Alcoa® Ingot are in the best position to profit from Alcoa's leadership in research and development. For more information, call your nearest Alcoa sales office.

ALCOA ALUMINUM
INGOT

Alcoa Aluminum Ingot is refined, clean, pure, sound, uniform and customized

•

FREE ALCOA EXTRUSION INGOT BOOKLET! SEND TODAY!



Aluminum Company of America, 860-L Alcoa Building, Pittsburgh 19, Pa.
Please send free booklet on Alcoa Aluminum Extrusion Alloy Ingot.

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EXTRUDING

High speed fully automatic multiple press operation with automatic transfer equipment able to extrude and handle complicated shapes up to seven inches wide.

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Twenty-two foot tanks for clear and color anodizing. Buffing, polishing and chemical brightening also available.

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All standard types of packing plus cocooning, sleeving and interleaving. Custom packaging to meet your requirements.

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Adequate fleet of late model trucks assures dependable delivery. All drivers and handlers experienced in loading and transporting delicate cargo.

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Sales Engineers fully trained in extrusion technology to answer your questions on the welding, machining, forming etc. of aluminum extrusions.

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Financial Briefs

Alcoa's 9-Months Net Below 1960 Gain

On a quarterly basis **Aluminum Co. of America's** third quarter business ran slightly ahead of the same quarter last year. This year's nine months' business, however, trailed the same period in '60. Net income for the third quarter was $9,399,971, or 41 cents a common share, compared with $8,553,203, or 37 cents in the third quarter of 1960. Sales and operating revenues were $208,873,696 in the third quarter. The figure for the same quarter last year was $214,547,756.

Net income for the nine months ended September 30 totaled $29,341,497, or $1.29 per common share. Income for the same period in 1960 was $30,279,511, or $1.33 per common share. Sales and operating revenues for the first nine months were $621,817,428, compared with $657,576,707 in the same period last year.

Bohn Shows Substantial Improvement in Sales, Profits

The profit picture of **Bohn Aluminum & Brass Corp.**, Detroit, looks brighter as the company heads toward its year-end accounting. Net profits for the third quarter amounted to $149,599, equal to 31c per share on 477,952 outstanding shares. In the third quarter of 1960, earnings were $60,468 or 12c per share.

Terry W. Kuhn, Bohn's president, anticipates higher sales volume and "substantially higher operating profits" in the fourth quarter than in that period in 1960. Despite the absorption year-to-date of approximately $542,000 in nonrecurring expenses incidental to its plant modernization program, Bohn earned 73c per share in the first nine months of this year, with net sales of $34,940,121.

Kaiser Registers Slight Improvement Over '60 Pace

Net third quarter earnings of **Kaiser Aluminum & Chemical Corp.** were $5,475,000. For the same quarter in 1960 earnings were $5,802,000, including a favorable federal income tax adjustment of about $1,800,000. Third quarter net sales were $105,698,000, compared with $99,324,000 in the 1960 quarter. On a per-share basis, Kaiser's third quarter earnings amounted to 27 cents per common share after preferred dividends, compared with 31 cents in 1960.

The first nine months of 1961 netted $23,515,000 before federal taxes on net sales of $312,134,000. The net last year for the same period was $23,950,00 (including the aforementioned federal tax adjustment) on $313,584,000 net sale

Prospects for improved fourth qua sales, both domestic and export, ap favorable at this time as the dom economy continues its forward prog

1961 Will Be Record Year for Kawneer

Kawneer Co., Niles, Mich., manu turer of architectural products, sho increases of 26% in net earnings 9% in sales in the first nine month this year, and third quarter sales earnings were the largest in its hist according to Lawrence J. Plym, p dent. Orders on hand indicate an time sales high in 1961, he stated.

For the first nine months sales $31,905,957, and net earnings $1,312,673, or $1.34 a share. This pares with sales of $29,177,200 and income of $1,038,187 or $1.06 a shar the corresponding 1960 period. For three months to September 30, sales were $11,321,014, and net inc was $603,651 or 62 cents a share, pared with sales of $10,814,353 and earnings of $556,290 or 57 cents a s in the corresponding 1960 quarter.

Price Cuts Slow Olin Aluminum's Gain

The Metals Division of **Olin Ma son Chemical Corp.** reports sales creases for its aluminum operation the first nine months of 1961. "Al num profits for the nine months encouraging, the division said, "bu cent price cuts in the aluminum in try are affecting profits. For the run, however, a return to normal levels is to be expected."

Generally, Olin's business was sli better than a year ago, but the pany's third quarter net was d Third quarter sales were $179,87 compared with $179,471,000 in the 1960 quarter. Net profits totaled 449,000, or 50 cents a share, com with $7,771,000, or 58 cents a s the year before.

Olin's sales and operating rev for the first nine months totaled 608,000, compared with $527,75 Net profits totaled $20,851,000 or per share, compared with $26,43 or $1.98 per share in 1960, incl about 18 cents per share from n operations which became a pa United Nuclear Corp. on May 31,

Revere Reports Nine Months Earnings Gain

Net income of **Revere Coppe Brass Inc.** for the first nine mont

605, or $2.04 per share. This is a increase over the comparable pe- 1 1960 when net income was $5.- 4, or $1.95 per share. Sales for eriod totaled $162,786,457—1.2% the $164,804,108 for the same peri- 1960.

rd quarter earnings were $1,591,- p $176,292 from the correspond- eriod in 1960, on sales of $52,- 6, that showed a gain of 6.3% he same period last year.

Months Sales Up, But ts Off For Reynolds Metals

nolds Metals Co. had satisfactory quarter business, but the nine ns picture was less cheering. The any had consolidated net sales of 142,000 in the third quarter, com- with $113,942,000 in the same er a year ago. Consolidated net for this year's third quarter was ,000, against $5,854,000 a year ago. ncome for the three months period ual to 32 cents a share, after divi- on preferred stock. The equiva- igure a year ago was 29 cents.

nsolidated net sales for the first months were $348,074,000, com- with $330,056,000 in 1960. Net ne was $17,660,000 this year, and 72,000 a year ago. Consolidated net ne for the nine months is equal to nts a share, after dividends on pre- d stock, compared with 97 cents last

ninium Limited Feels down of Kitimat

minium Limited reported that h American demand for their metal nues to be somwhat stronger than ar ago, but that sales in Europe most other markets are still below levels.

ne Canadian company netted $20,- 00, or 68 cents a share, in the first months, compared with $31,995,000 5 per share) in the same period ear. Third quarter income was only million, compared with $10.1 mil- in the same period last year. Rea- The three-month shut-down of the nat smelter for repairs affected the terly results to the extent of $3.6 on, while last year's third quarter fited to the tune of about $1 mil- from the receipt of non-recurring ellation fees.

nsolidated sales and operating reve- in the first nine months were $379,- 00, as against $380,197,000 last year.

mited sold 501,000 tons of alumi- in the first nine months, 4% under 24,000 tons sold in the same period year. However, third quarter sales 70,000 tons were 4% ahead of 's like period.

Pre Finished Metals

Better finish . . . at lower cost!

Cut metal product finishing costs as much as 10% to 25% by using steel or aluminum coils or sheets *already pre-coated* by Pre Finish Metals, Inc., specialists in applying custom-formulated finishes! Pre-coating also assures a more uniform, better quality, more durable finish for either functional or decorative use.

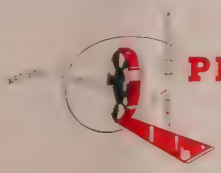
Stamp, draw, shape, bend, or form it!

Pre-coated metal actually aids fabricating operations in your plant! The finish acts as a lubricant for better flow of material—and longer die life. You also save on production costs, reduce space requirements, and add product sales appeal.

To meet your specifications!

Coatings are custom formulated and pre-tested to meet product fabricating and use requirements! Unlimited color variations, patterns, wood grains, and embossed designs are supplied in finishes ranging from organic coatings (organosols, plastisols, expoxies, acrylics, alkyds) to polyvinyl film laminates. *Supply your own metal or we will furnish.*

For the cost-cutting facts, call or write . . .



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ROLL Former twelve station 1½" x 12" spindles, set up to form 8" lap aluminum Siding ½" butt. All set to produce at a rate of 100-to-150 feet per minute. Can be seen in operation. Also have available roll dies to form Siding accessories, J channels, Starter Strips, outside corners. Package deal or piece-meal. Best offer.

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Chicago 11, Ill.

Our want ad rates are ridiculously low (only $15 a column inch) but they sure get RESULTS

FOR SALE:

CARPORT and Patio Cover roll former operation. Complete set-up of twelve station 1½" x 12" spindle machine. Consisting of three complete sets of rolls to form top section interlock (Navaco type) panel, 2" x 2" gutter section, .040 facia section. Can be seen in operation. Best offer. Also have roll dies to form .040 x 1½" x 3" lockseam rafter awning tubing. Fits 1½" diameter spindles.

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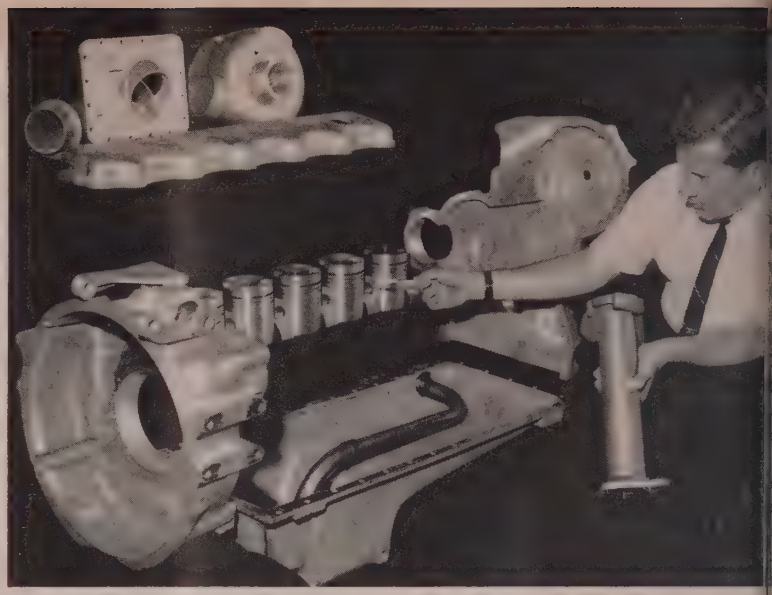


How To Shave Weight From Diesel Engines

A new lightweight diesel engine, built by Caterpillar Tractor Co., Peoria, Ill. is filling a demand for a powerplant providing better performance, economy, and less weight for over-the-road tractor-trailer combinations, ready-mix concrete trucks, and heavy dump trucks. The Cat Model 1673 uses more than 150 pounds of aluminum.

According to George E. Herrman, manager of transportation sales for Aluminum Co. of America, the 6-cylinder, 4-cycle Cat Model 1673 utilizes aluminum for housings, pistons, pressure vessels, bearings, brackets, fasteners, and piping. He estimates this saves at least 250 pounds of otherwise "dead" weight.

The engine weighs but slightly more than a ton, yet it is built to power loaded rigs weighing more than 37 tons.

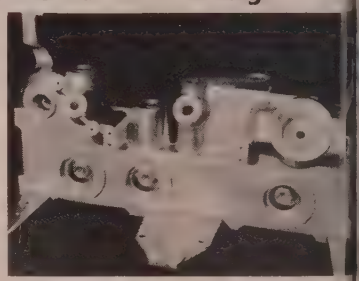
Although the unit is a brand new truck powerplant, many thousands of Caterpillar engines of the same stroke have performed on other assignments throughout the world.

Richard Warner, Caterpillar's de engineer for the lightweight en used aluminum for any compo where the metal would remove w at no cost disadvantage. Among group are many load-bearing parts.

Aluminum alloy bearings const an advantage in the engine. They chosen for high load-carrying ab and resistance to crankcase acids.

Other aluminum components ir diesel are: pistons, turbocharger, ge tor, a 38-pound flywheel housing, ing gear, and fuel filter housings, pound oil pan, a die-cast valve c aftercooler side plates, air-brake pressor pistons, aftercooler fins, t charger nozzle rings, and miscellan brackets and fasteners.

Permanent Mold Casting Aids Dental Drill Design



A complex sand-cored, permanent-mold aluminum casting developed by Rostad Aluminum Corp., Grafton, Wis., in conjunction with Mid-West Dental Mfg. Co., Chicago, has made it possible to improve high speed painless dental drills and attachments.

The high speed air-driven drill, using a constant water stream injection for frictional cooling, operates at speeds up to 300,000 rpm. Such rotary speeds lie far beyond the human vibration perception level — the major cause of pain and distress.

The aluminum casting, pictured above, serves as the main internal base of the drill control cabinet. Made of 356 aluminum alloy, the one-piece casting is designed with numerous honeycomb cores and large internal pa ways, curved to eliminate air turbu — a source for painful vibrations. minum was selected for the cor part because of excellent casting pr ties and resistance to corrosion.

By design, the lightweight cast

n base acts as a versatile primary
re to which additional accessory
s may be attached and operated.

oduce New Line Metal Cleaners

new line of metal cleaners have developed by Allied Research cts, Inc., 4004 E. Monument St., nore 5, Md. They are specially ilated for a broad range of uses, are particularly adapted for use processes served by other Allied rch formulations.

e new cleaners include ARP No. eavy duty soak cleaner and electro- er; ARP No. 105, a general pur- cleaner for soak and electro-clean- perations; ARP No. 115, a medium nity soak cleaner; ARP No. 120, a um alkalinity high-detergency soak er; ARP No. 125, a low foaming er for use in automatic power spray ing machines; and ARP No. 130, kaline de-ruster for ferrous metals.

noe Paddle in Aluminum eighs Less, Will Float

n unsinkable aluminum paddle e by a novel process and weighing than half as much as conventional e paddles of wood or metal has n introduced by Norton Mfg. Co., 5 W. St. Paul Ave., Chicago.

he new paddle is correctly balanced, a bright anodized finish to prevent oloration and, of course, will not p, split or become splintery in the er or sun. It weighs 22 ounces, com- ed with at least twice as much for ted aluminum paddles and with ut three pounds for high-quality uce paddles.

he smooth, seamless blade of a rton paddle is made from a specially igned, hollow aluminum Roll-Bond te produced by the Metals Division Olin Mathieson Chemical Corp. This te is inflated by hydraulic pressure then filled with foamed-in-place thane plastic. The foam not only s to the stiffness of the paddle blade also would block the entry of water he event of accidental puncture.

Prices Most Inviting

on our IN-STOCK SUPPLY of over 18,000 items and 5,000,000 lbs.

ALUMINUM SHEETS

Pounds	Gauge	Size	Alloy	Price
10,000	.020	36 x 96	3003-H14	.43
10,000	.032	36 x 96	3003-H14	.42
5,000	.032	36 x 96	5052-H32	.485
5,000	.040	36 x 96	3003-H14	.415
5,000	.040	36 x 96	5052-H32	.42
10,000	.050	48 x 144	5052-H32	.455
10,000	.063	48 x 144	6061-T6	.48
10,000	.090	48 x 144	6061-0	.445
13,000	6"	48 x 96	Tooling Plate	.45

• ALSO CLEAR ANODIZED SHEETS • ALL SIZES, ALLOYS, FINISHES

ALUMINUM ROUND ROD

Pounds	Size	Alloys	Price
10,000	1/4	2011-T3	.51
10,000	3/8	2011-T3	.50
5,000	3/8	2017-T4	.55
3,000	3/8	2024-T4	.55
5,000	1/2	2011-T3	.50
5,000	1/2	2017-T4	.53
5,000	5/8	2017-T4	.53
5,000	5/8	2024-T4	.55
5,000	3/4	2017-T4	.52
10,000	1	2011-T3	.51
5,000	1	2017-T4	.50
10,000	1 1/2	2011-T3	.47
10,000	2	2011-T3	.47

ALUMINUM HEXAGON ROD

2,000	5/16	2011-T3	.60
2,000	3/8	2011-T3	.59
2,000	7/16	2011-T3	.58
2,000	1/2	2011-T3	.58
2,000	5/8	2011-T3	.58
2,000	5/8	2017-T4	.58

ROUNDS • SQUARES • RECTANGULARS • ALL DIAMETERS • ALL ALLOYS

BRASS TUBE (70/30 1/2H)

Pounds	Size		Price
2,000	5/16 x .040		.50
2,000	5/16 x .050		.50
3,000	25/64 x .040		.50
2,000	3/8 x .020		.60
3,000	29/32 x .064		.50
1,000	5/8 x .040	Prepolished	.65
4,000	3/4 x .020		.60
2,000	3/4 x .040		.50

SOFT BRASS CIRCLES (70/30)

Pounds	Size	Price
3,000	.020 x 6 3/4"	.45
5,000	.020 x 7"	.45
8,000	.023 x 13"	.45
3,500	.025 x 14"	.45
7,000	.025 x 15"	.45

SOFT BRASS COIL (70/30)

Pounds	Size	Price
14,000	.015 x 8 1/2"	.46
29,000	.015 x 4 1/4"	.46
3,000	.020 x 7"	.45
2,000	.020 x 14"	.45

SOFT COPPER CIRCLES

Pounds	Size	Price
8,000	.020 x 7"	.45
5,000	.020 x 10 1/2"	.45
4,000	.020 x 11"	.45
1,000	.025 x 12"	.45
1,500	.025 x 14"	.45

COPPER SHEETS

Pounds		Size		Price
10,000	16 oz.	30 x 96	ANN.	.45
2,000	16 oz.	36 x 96	ANN.	.45
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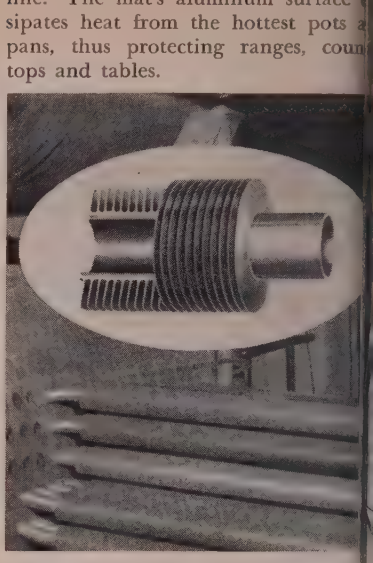
See Diverse Uses for Aluminum-Rubber Combination

Aluminum sheet and foil now can be permanently vulcanized onto rubber, yielding a material combining the surface toughness, corrosion resistance and insulative values of aluminum with the flexibility of rubber.

The process, which has been proved feasible through commercial application, is made possible by a special aluminum coating developed by the Packaging Reseach Division of Reynolds Metals Co. Applications for the aluminum-vulcanized rubber include aluminum tire cords for longer wear, flexible aluminum-covered pipe and tubing, tenting and tarpaulins.

Reynolds applies the coating to the metal and ships it to customers in roll form. When the rubber is vulcanized, the aluminum becomes an integral part, as difficult to remove as the tread on an automobile tire. The exposed aluminum surface can be attractively decorated with color, printing, or embossing.

The new process has received its initial application in a household stove and counter mat manufactured by Rubbermaid, Inc., Wooster, Ohio, for incorporation in its national housewa line. The mat's aluminum surface sipates heat from the hottest pots pans, thus protecting ranges, coun tops and tables.



Integrally Finned Tubing Boon To Air Preheaters

Highly efficient air preheaters are important feature of the new plant mid-western utility company. Desig for handling 102,600,000-BTU per h heat duty, they are equipped special-purpose, high-capacity heat changer tubes which utilize steam from turbines (inside the tubes) to heat combustion air required fo 1,780,000-lb./hr. steam boiler.

These air preheaters are an impor contribution to keeping plant opera efficiency high and costs low. The son, basically, is that these units equipped with integrally finned t Designed especially for heat trar applications involving circulation air, the tube was pioneered by Wolverine Tube Division of Calum Hecla, Inc., Allen Park, Mich.

Totalling more than 280,000 sq feet of surface area, tube used in particular installation varies in le from 13 to 16 feet. The outer tub aluminum alloy 6063 is mechani bonded to an inner liner of alumi alloy 6061, Temper T-4. There ar fins to the inch. Wolverine calls it fin L/C tube.

Use of integrally finned Trufin L/C proves particularly advantageou heat transfer applications such as air preheater installation for a nur of reasons. In the first place, maxi heat transfer is achieved as the ext ed outer surface of integral fins pro more heat transfer surface area in space. Hence, both material and m are saved.

Again, as the fins are an integral of the tube wall, they successfully stand the varying temperatures, v tion, and thermal shock imposed by type of heat exchange equipment.

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AND
STAINLESS
ABM MEANS TUBING
ESTABLISHED 1845
A B MURRAY CO INC
ELIZABETH, N. J. BRISTOL, PA. McKEESPORT, PA.

That's how Lawrence A. Harvey, chairman of Harvey Aluminum, sums up the promotional approach of this fast-growing aluminum producer.

"Modern Metals is essential reading, not only in the plants that presently buy Harvey Aluminum mill products, but also in those plants we hope to sell in the future," Harvey explains.

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ooking Ahead

d for aluminum has been zigging and zagging ever since the price cuts in September. Prices have tended to stabilize a little, although many an extruder is still giving the stuff away. No sensational upturn is in sight, but advance ordering for December and January looks favorable, and most sheet mills are busy. Growing demand for hard alloys will continue into 1962.

asting business, while not setting any records, is getting better as sales of new cars continue to gain. Appliances are selling better than in some time and this, too, has stimulated casting business. One of the biggest appliance makers is quietly finalizing plans to build a huge captive die casting operation that will cost better than $10 million. It should be completed in a year. Strangely enough, this new operation will not greatly reduce the firm's outside purchases of castings. Reason: A major redesign program now underway will switch many parts from stampings to die castings in 1963 models.

asting alloy ingot business is picking up slightly, but short-term buying is still the vogue. Aluminum scrap prices are weak; have been cut. It appears that obsolescent scrap is beginning to hit the market in tonnages that were not expected until 1963. If it continues, the smelter, the casting plant, and the product manufacturer will benefit.

ts for precoated sheet and coil are growing fast. Only six years ago you could count the number of roll-coating firms on your fingers. Today there are about 50 outfits roll-coating aluminum, plus another dozen painting steel. Some of the biggest steel firms are getting into the act, pushing their prepainted steel in national advertising. Demand is so brisk that one steel company paid for installing a paint line in a roll-coater's plant.

battle for precoated sheet markets is shaping up, with steel challenging aluminum in this booming business. So far, aluminum has a big lead — due mainly to aluminum siding. Regardless of who wins, both metals will benefit. The day may not be too far away when nearly all sheet and coil will be prepainted or pre-anodized before being shipped to a manufacturer's plant. Any sheet mill that isn't either planning a paint line, or having a roll coater do the job for them, may be be in trouble in a year or so. This is another symptom of the fast-developing mass production era that the aluminum industry must soon face.

her move in this direction occurred this month when Alcoa stopped accepting sheet orders of less than two tons and began diverting them to its distributors. It was long overdue. No big producer can process such small orders and break even. Short runs also retard delivery of bigger orders. This new policy (which other producers will surely follow) was adopted a week before the aluminum distributors' annual meeting; naturally gave them something new to chew on.

A distributor without equipment such as roller levellers, slitters, shears and saws had better install them or he might not be a distributor very long. The big mills will eventually get around to referring most orders for 15 tons or less to its distributors. Maybe aluminum distributors will be compelled to install paint lines as well.

What do aluminum users expect from their suppliers? Without asking, we've been getting the same answers from many firms in the past two months. Most users don't need sales aids, or advertising support, or extended credit, or indirect financing for new equipment or plant facilities. The most important thing, say users, is basic honesty. They don't care too much about the cost of aluminum (apparently it's economical enough) but they do want to be able to buy at the same price as their competitors. This would enable them to go out and fight for the markets.

"If our competitors couldn't get special deals, commodity prices or extended credit," says one large manufacturer, "we would happily compete with them, and all of us would prosper." If this is true, an industry-wide one-price policy would solve the major problem. Too bad it can't be done.

A few big aluminum fabricators are making like they want to become primary producers (including another copper producer), but the recent 2c aluminum price cut has forced at least one producer to cut manpower overhead to the bone. The sales force has been trimmed by 20%. This producer hasn't dropped its prices as yet; its sales have slipped sharply as a result.

Aluminum imports may be regulated by a sort of voluntary negotiated system based on historical use percentage. A proposal submitted to the government by the major aluminum firms suggests pegging imports to U. S. consumption. Aluminum producers would aid in increasing world consumption by developing new markets and uses. The 81-page report is concerned primarily with the widening gap between aluminum imports and exports — currently at a ratio of 7 to 5.

Tariffs on aluminum are increasing elsewhere in the world, despite the fact that in many foreign countries consumption exceeds production, the report states. Some may consider this approach a new type of cartel, and there is much uncertainty as to whether the system will get government backing. The idea is a clever one.

—The Editors

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FLAT

As Still Waters --Aluminum Sheet From Conalco's New Tension Roller Leveler

A number of siding manufacturers and producers of lithographic plates are investigating this new source of roller-leveled aluminum sheet. Conalco aluminum sheet is available in widths to 48 inches and in gauges from .008 to .050. Conalco produces aluminum sheet to high standards of metallurgical accuracy—standards that are routine for a company that has long specialized in top quality foil and super purity aluminum.

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APEX SMELTING COMPANY ANNOUNCES THE MOST SIGNIFICANT ALLOY DEVELOPMENT IN ITS 38-YEAR HISTORY

Aluminum Alloys for die casters now part of Allcast line

For years Allcast 70, developed by Apex laboratories, has been the alloy that sand and permanent mold foundries prefer for their difficult jobs to achieve consistently high fluidity, absence of shrinkage, pressure tightness and a consequent high yield with a minimum of rejected castings.

Recognizing that die casters, too, had need of an alloy possessing not only these characteristics, but also offering minimum sludging and soldering, Apex's technical staff experimented with a variety of alloy heats and additives. Yet, after hundreds of tests, the elusive goal of consistent results had still not been achieved.

Then, early this year, Apex's technical staff was elated to hit upon new refining and alloying procedures that held promise of yielding the desired results.

Would the resulting alloy stand up under "tough job" conditions in the field? To get the answer, Apex enlisted the help of a number of its die casting customers and asked them to put the new alloy to the test. With shipment after shipment, on a consistent basis, these customers reported obtaining benefits such as these:

Increased fluidity
Minimum sludge formation
Less porosity and cold flows
Less lubricant required
Less tendency to solder
More shots per hour
Lower casting temperatures
Extended die life
Brighter surface finish
Better machinability
Greater pressure tightness

Though the new alloy appeared assured of acceptance, another big obstacle to practical adoption still remained—the substantially higher production costs of the new refining and alloying procedures. It remained for the Apex executive committee to resolve this problem by authorizing the expenditure of up to a million dollars for plant modernization and new equipment whose greater efficiency is expected to offset the increased costs. At the same time, the executive committee authorized immediate adoption of the new procedures with Apex absorbing the higher costs.

Apex Allcast aluminum die cast alloys, prepared in conformance with standard or custom specifications, are now available at Apex's Chicago, Cleveland and Los Angeles plants.

APEX SMELTING COMPANY

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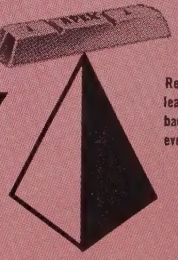

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